



United States
Department of
Agriculture

Forest Service

**Northeastern
Area**

State & Private
Forestry

NA-PR-05-96

Forest Response Program

Bibliography



Contents

Introduction	2
Atmospheric Exposure Research Cooperative	4
Eastern Hardwoods Research Cooperative	8
National Program Management	14
National Vegetation Survey	15
Quality Assurance Project	24
Southern Commercial Forest Research Cooperative	26
Spruce-Fir Research Cooperative	53
Synthesis and Integration Project	76
Western Conifers Research Cooperative	79

Introduction

The public's attitude toward air pollution in the United States evolved substantially during the 1960's. One of the results of the nation's emerging environmental ethic was the creation of the U.S. Environmental Protection Agency (EPA) in December of 1970. Prior to this time, research was focused on the impacts of air pollution on human health and welfare and was largely conducted by several Federal research agencies, which included the Department of Health, Education, and Welfare; the National Oceanic and Atmospheric Administration; and the U.S. Department of Agriculture. After the creation of the EPA, much of this work was consolidated in one regulatory agency, which resulted in periodic evaluations of the various effects of atmospheric pollution on human health, materials, agriculture, and forest ecosystems.

At the same time that environmental interest was growing in the United States, concern increased in the European scientific community and public over the ecological impacts of acidic deposition. As the magnitude of the damage to European lakes and streams and the widespread decline in Norway spruce and silver fir was reported, concern that similar problems were occurring in the United States increased substantially. This concern was heightened by press reports of high-elevation spruce-fir forest declines in the Adirondack and Appalachian Mountains and the decline and death of sugar maples in the north-eastern United States and Canada. During the early 1980's, it was not uncommon to read stories from respected news organizations quoting scientists as suggesting that our lakes and streams would soon be too acidic to support existing aquatic ecosystems and that much of the forests in the eastern United States were exhibiting symptoms of substantial decline and death.

During the early 1980's, acid deposition emerged as the dominant theme for air pollution research in the U.S. government. The National Acid Precipitation Assessment Program (NAPAP) was created by congressional action in 1979 to develop and implement an "acid rain" research strategy. NAPAP was a collaborative effort among several Federal agencies. It was organized around a series of work groups responsible for the effects on various aspects of the acid deposition problem. NAPAP was authorized for 10 years and scheduled for a culminating assessment in 1990. Because of the interagency nature of the program, significant compromises and accommodations had to be made during the initial stages of research funding and implementation. One consequence of difficulties encountered in implementing such a large national research program was the five-year delay in starting the Forest Response Program (FRP). The FRP was a joint interagency research program initiated in 1985 between the USDA Forest Service and the U.S. EPA. Additional financial support for the FRP came from the National Council of the Forest Industry for Air and Stream Improvement, Coal Producers, and the Electric Power Research Institute. The FRP was organized into four regional research cooperatives to address three principal policy questions: (1) Is there a significant problem of forest damage in North America that might be caused by acid deposition alone or in combination with other pollutants; (2) What is the causal relationship between air pollutants and forest damage; and (3) On a stand or regional basis, what is the dynamic relationship between air pollutants and forest damage?

As is often the case with Federally-funded research, events overtook the timeframe of the Forest Response Program. The relatively slow start of the program combined with the scientific challenge of testing hypotheses on long-lived perennial trees within five years proved a major challenge to the scientific community. At the time of the enactment of the Clean Air Act Amendments, only the first policy question could be addressed in any significant way. The scientific results that would address the remaining two policy questions were barely underway before the enactment of the Clean Air Act Amendments.

In spite of the inability of scientific inquiry to meet political schedules, much important work has been accomplished to elucidate the relative impacts of acidic deposition and other air pollutants on forest ecosystems. Different environmental conditions, forest types, species sensitivities, occurrences of natural stressors such as drought, disease, and insect activity, and pollution patterns suggest that pollutant effects may vary around the country. To focus on problems most germane to specific areas, the FRP organized regional research cooperatives. Four cooperatives corresponding to major forest types or regions were established: spruce-fir, southern commercial, eastern hardwoods, and western conifers. Supporting groups included the Atmospheric Exposure Coop, National Vegetation Survey, Synthesis and Integration, Quality Assurance, and National Program Management. This document lists the publications generated by these entities.

Gerard D. Hertel
USDA Forest Service
Program Manager
Forest Response Program

Roger Blair
U.S. Environmental Protection Agency
Deputy Program Manager
Forest Response Program

Atmospheric Exposure Research Cooperative

- Agrawal, M.; Rao, D.N. 1987. Influence of fluoride pollution on plants and cattle - a case study. In: Rugg-Ginn, A.J.; Rahamatulla, M., eds. New frontiers in fluoride studies for health, proceedings of an international workshop on fluoride and dental health; 1987 January 5-8; Madras, India. [Place of publication unknown]: Committee on Science and Technology in Developing Countries: 229-236.
- Aneja, V.P.; Businger, S.; Li, Z.; Clairborn, C.S.; Murthy, A. 1991. Ozone climatology at high elevations in the southern Appalachians. *Journal of Geophysical Research*. 96D: 1007-1021.
- Aneja, V.P.; Clairborn, C.S.; Bradow, R.L.; Paur, R.J.; Baumgardner, R.E. 1990. Dynamic chemical characterization of montane clouds. *Atmospheric Environment*. 24A: 563-572.
- Aneja, Viney P.; Claiborn, Candis S.; Li, Zheng; Murthy, Anuradha. 1994. Trends, seasonal variations, and analysis of high-elevation surface nitric acid, ozone, and hydrogen peroxide. *Atmospheric Environment*. 28(10): 1781-1790.
- Aneja, Viney P.; Murthy, Anuradha B. 1994. Monitoring deposition of nitrogen-containing compounds in a high-elevation forest canopy. *Journal of Air & Waste Management Association*. 44: 1109-1115.
- Aneja, Viney P.; Kim, Dueg-Soo. 1993. Chemical dynamics of clouds at Mt. Mitchell, North Carolina. *Journal of the Air & Waste Management Association*. 43(8): 1074-1083.
- Beltz, N.; Jaeschke, W.; Kok, G.L.; Gitlin, S.N.; Lazrus, A.L.; McLaren, S.; Shakespeare, D.; Mohnen, V.A. 1987. A comparison of the enzyme fluorimetric and the peroxyoxalate chemiluminescence methods of measuring H_2O_2 . *Journal of Atmospheric Chemistry*. 5: 311-322.
- DeFelice, T.P. 1989. Characterization of extreme deposition of air pollutants in Mt. Mitchell State Park: potential for forest decline and opportunity for cloud deacidification. Raleigh, NC: North Carolina State University, Department of Marine, Earth, and Atmospheric Sciences. 200 p. Ph.D. dissertation.
- DeFelice, T.P.; Saxena, V.K. 1991. The characterization of extreme episodes of wet and dry deposition of pollutants on an above cloud-base forest during its growing season. *Journal of Applied Meteorology*. 30: 1548-1561.
- Galvin, P.; Mohnen, V.A. 1987. Measurement of ozone and other oxidants at mountain sites in the eastern U.S. In: Proceedings of the North American Oxidant symposium; 1987 February 25-27; Quebec, Canada. [Publication information unknown]: 395-410.
- Gilliam, F.S.; Sigmon, J.T.; Reiter, M.A.; Krovetz, D.O. 1989. Elevational and spatial variation in daytime ozone concentrations in the Virginia Blue Ridge Mountains: implications of forest exposure. *Canadian Journal of Forest Research*. 19(4): 422-426.

-
- Hornig, J.F.; High, C.J.; Thorne, P.G. 1988. Instrumentation for obtaining meteorological and precipitation information at multiple remote forest sites. In: Hertel, G.D., tech. coord. Effects of atmospheric pollutants on the spruce-fir forests of the eastern United States and the Federal Republic of Germany. Proceedings of the United States/Federal Republic of Germany research symposium; 1987 October 19-23; Burlington, VT. Gen. Tech. Rep. NE-120. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station: 183-190.
- Kavender, K.A. 1988. Measurement of a vertical ozone concentration profile in a slash pine forest. Gainesville, FL: University of Florida, Department of Environmental Engineering Sciences. 250 p. M.S. thesis.
- Keene, W.C.; Galloway, J.N. 1988. Biogeochemical cycling of formic and acetic acids through the troposphere: an overview of current understanding. *Tellus*. 40B: 322-334.
- Kim, Deug-Soo; Aneja, V.P. 1992. Chemical composition of clouds at Mt. Mitchell, North Carolina, USA. *Tellus*. 44B: 41-53.
- Kim, Deug-Soo; Aneja, Viney P. 1992. Microphysical effects on cloud water acidity: a case study in a nonprecipitating cloud event observed at Mt. Mitchell, North Carolina. *Journal of the Air & Waste Management Association*. 42(10): 1345-1349.
- Krovetz, D.O.; Reiter, M.A.; Sigmon, J.T. 1988. An inexpensive thermocouple probe amplifier and its response to rapid temperature fluctuations in a mountain forest. *Journal of Atmospheric and Oceanic Technology*. 5: 870-874.
- Krovetz, D.O.; Reiter, M.A.; Sigmon, J.T.; Gilliam, L.S. 1988. Assembly and field testing of a ground-based presence of cloud detector. *Journal of Atmospheric and Oceanic Technology*. 5(6): 579-581.
- Lefohn, A.S.; Mohnen, V.A. 1986. The characterization of ozone, sulfur dioxide and nitrogen dioxide for selected monitoring sites in the Federal Republic of Germany. *Journal of the Air Pollution Control Association*. 36: 1329-1337.
- Lefohn, A.S.; Runeckles, V.C.; Krupa, S.V.; Shadwick, D.S. 1989. Important consideration for establishing a secondary ozone standard to protect vegetation. *Journal of the Air Pollution Control Association*. 39: 1039-1045.
- Lefohn, A.S.; Shadwick, D.S.; Feister, U.; Mohnen, V.A. 1992. Surface-level ozone: climate change and evidence of trends. *Journal of the Air & Waste Management Association*. 42: 136-144.
- Li, Zheng; Aneja, Viney P. 1992. Regional analysis of cloud chemistry at high elevations in the eastern United States. *Atmospheric Environment*. 26A(11): 2001-2017.

-
- Lin, N.H. 1988. Investigations on cloud chemistry and acidic deposition at Mt. Mitchell, N.C. using a cloud deposition model. Raleigh, NC: North Carolina State University, Department of Marine, Earth, and Atmospheric Sciences. 149 p. M.S. thesis.
- McIntyre, B.M.; Scholl, M.A.; Sigmon, J.T. 1989. A quantitative description of a deciduous forest canopy using a photographic technique. *Forest Science*. [Volume and page numbers unknown].
- Mohnen, V.A. 1989. Air pollutant distribution patterns: elevational gradients/local chemistry. In: Bucher, J.; Bucher-Wallin, I., eds. *Proceedings of the International Union of Forestry Research Organizations conference on air pollution and forest decline*; 1988 October 2-8; Interlaken, Switzerland. Birmensdorf, Switzerland: IUFRO: 79-82.
- Mohnen, V.A. 1989. Exposure of forests to air pollutants, clouds, precipitation, and climatic variables. EPA/600/53-89/003. Research Triangle Park, NC: U.S. Environmental Protection Agency, Atmospheric Research and Exposure Assessment Laboratory. 190 p.
- Mohnen, V.A. 1989. Mountain cloud chemistry project - wet, dry and cloud water deposition. EPA/600/53-89/009. Research Triangle Park, NC: U.S. Environmental Protection Agency, Atmospheric Research and Exposure Assessment Laboratory. 77 p.
- Mohnen, V.A. 1988. The mountain cloud chemistry program. In: Hertel, G.D., tech. coord. *Effects of atmospheric pollutants on the spruce-fir forests of the eastern United States and the Federal Republic of Germany. Proceedings of the United States/Federal Republic of Germany research symposium*; 1987 October 19-23; Burlington, VT. Gen. Tech. Rep. NE-120. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station: 27-60.
- Mueller, S.F.; Weatherford, F.P. 1988. Chemical deposition to a high elevation red spruce forest. *Water, Air, and Soil Pollution*. 38: 345-363.
- Robarge, W.P.; Bruck, R.I.; Cowling, E.B. 1988. Throughfall and stemflow measurements at Mt. Mitchell, North Carolina during the summer of 1986: a preliminary report. In: Hertel, G.D., tech. coord. *Effects of atmospheric pollutants on the spruce-fir forests of the eastern United States and the Federal Republic of Germany. Proceedings of the United States/Federal Republic of Germany research symposium*; 1987 October 19-23; Burlington, VT. Gen. Tech. Rep. NE-120. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station: 111-116.
- Saxena, V.K.; Lin, N.H. 1988. Relative importance of dry, wet and cloud capture mechanisms for acidic deposition. In: Hockeiser, S.; Jayenty, R.K.N., eds. *Symposium on measurements of toxic and related air pollutants*; [Year unknown] May 1-4; Raleigh, NC. Pittsburgh, PA: U.S. Environmental Protection Agency and Air Pollution Control Association: 237-247.

-
- Saxena, V.K.; Stogner, R.E. 1987. Wet deposition on forest canopy at Mt. Mitchell, North Carolina. In: Hockeiser, S.; Jayenty, R.K.N., eds. Symposium on measurements of toxic and related air pollutants; [Year unknown] May 1-4; Raleigh, NC. Pittsburgh, PA: U.S. Environmental Protection Agency and Air Pollution Control Association Symposium: 189-194.
- Saxena, V.K.; Stogner, R.E.; Hendler, A.H.; DeFelice, T.P.; Yeh, R.J. 1989. Monitoring the chemical climate of the Mt. Mitchell State Park for evaluating its impact on forest decline. *Tellus*. 41B: 92-109.
- Saxena, V.K.; Yeh, R.J. 1989. Temporal variability in cloud water acidity: physio-chemical characteristics of atmospheric aerosols and windfield. *Journal Aerosol Science*. 19: 1207-1210.
- Sigmon, J.T.; Gilliam, F.S.; Partin, M.E. 1989. Precipitation and throughfall chemistry for a montane hardwood forest ecosystem: potential contributions from cloud water. *Canadian Journal of Forest Research*. 19: 1240-1247.
- Sjostedt, D.W. 1987. A characterization of the nocturnal low-level jet in the Carolinas. Blacksburg, VA: University of Virginia, Department of Environmental Sciences. [Number of pages unknown]. M.S. thesis.
- Smith, William H. 1991. Air pollution and forest damage. *Chemical and Engineering News*. 69(45): 30-43.
- Stogner, R.E. 1989. Acidic deposition to Mt. Mitchell, North Carolina area forests resulting from direct cloud droplet interception. Raleigh, NC: North Carolina State University, Department of Marine, Earth, and Atmospheric Science. 124 p. M.S. thesis.
- Stogner, R.E.; Saxena, V.K. 1988. Acidic cloud-forest canopy interactions: Mt. Mitchell, NC. *Environmental Pollution*. 53: 456-458.
- Vogelmann, A.F.; Rock, B.N. 1988. Anatomy of red spruce needles from forest decline sited in Vermont. *Environmental Experimental Botany*. 28: 19-26.
- Yeh, R.J. 1988. Measurements of cap cloud water acidity and windfield for evaluating cloud-canopy interactions in Mt. Mitchell State Park. Raleigh, NC: North Carolina State University, Department of Marine, Earth, and Atmospheric Science. 165 p. M.S. thesis.
-

Eastern Hardwoods Research Cooperative

- Barger, J.H.; Hall, R.W.; Townsend, A.M. 1992. Elm leaf beetle performance on ozone-fumigated elm. Res. Pap. NE-661. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station. 9 p.
- Burton, A.J.; Pregitzer, K.S.; Reed, D.D. 1991. Leaf area and foliar biomass relationships in northern hardwood forests located along an 800 km acid deposition gradient. *Forest Science*. 37: 1041-1059.
- Burton, A.J.; Ramm, C.W.; Pregitzer, K.S.; Reed, D.D. 1991. Use of multivariate methods in forest research site selection. *Canadian Journal of Forest Research*. 21(11): 1573-1580.
- Davis, D.D.; Skelly, J.M. 1992. Foliar sensitivity of eight eastern hardwood tree species to ozone. *Water, Air, Soil Pollution*. 62: 269-277.
- Davis, D.D.; Skelly, J.M. 1992. Growth response of four eastern hardwood species to ozone, acidic precipitation, and sulfur dioxide. *Air & Waste Management Association*. 42: 309.
- Davis, D.D.; Skelly, J.M.; Lynch, J.A.; McClenahan, J.R. 1990. Forest health along a pollution gradient: a case study. In: *Proceedings, Society of Environmental Toxicology and Chemistry 11th annual meeting*; 1990 November 11-15; Washington, DC. [Publication information unknown]. Abstract.
- Davis, D.D.; Skelly, J.M.; Lynch, J.A.; McCormick, L.H.; Nash, B.L.; Simini, M.; Cameron, E.A. 1991. Measurement of forest condition and response along the Pennsylvania atmospheric deposition gradient. In: McCormick, Larry H.; Gottschalk, Kurt W., eds. *Proceedings, 8th central hardwood forest conference*; 1991 March 4-6; University Park, PA. Gen. Tech. Rep. NE-148. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station: 579-581.
- Foster, J.R.; Loats, K.V.; Jensen, K.F. 1990. Influence of two growing seasons of experimental ozone fumigation on photosynthetic characteristics of white oak seedlings. *Environmental Pollution*. 65: 371-380.
- Grimm, J.W.; Lynch, J.A. 1991. Statistical analysis of errors in estimating wet deposition using five surface estimation algorithms. *Atmospheric Environment*. 25A(2): 317-327.
- Hendrick, R.L.; Pregitzer, K.S. 1992. The demography of fine roots in a northern hardwood forest. *Ecology*. 73(3): 1094-1104.
- Houston, David R.; Allen, Douglas C.; Lachance, Denis. 1990. Sugarbush management: a guide to maintaining tree health. Gen. Tech. Rep. NE-129. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station. 55 p.

-
- Jensen, K.F.; Dochinger, L.S. 1989. Response of eastern hardwood species to ozone, sulfur dioxide and acid precipitation. *Journal Air Pollution Control Association*. 39: 852-855.
- Karnosky, D.F. 1989. Air pollution induced population changes in North American forests. In: Bucher, J. B.; Bucher-Wallin, I., eds. *Proceedings of the International Union of Forestry Research Organizations conference on air pollution and forest decline*; 1988 October 2-8; Interlaken, Switzerland. Birmensdorf, Switzerland: IUFRO: 315-317.
- Karnosky, D.F. 1989. Mechanisms of genetic control of air pollution tolerance in forest trees. In: Noble, R.D.; Martin, J.L.; Jensen, K.F., eds. *Proceedings of the 2nd US-USSR symposium on air pollution effects on vegetation including forest ecosystems*; 1988 September 13-25; Corvallis, OR, Raleigh, NC, and Gatlinburg, TN. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station: [Page numbers unknown].
- Karnosky, D.F.; Gagnon, Z.E.; Reed, D.D.; Witter, J.A. 1992. Growth and biomass allocation of symptomatic and asymptomatic *Populus tremuloides* clones in response to seasonal ozone exposures. *Canadian Journal of Forest Research - Journal Canadien de La Recherche Forestiere*. 22(11): 1785-1788.
- Karnosky, D.F.; Witter, J.A.; Gagnon, Z.E.; Reed, D.D. 1992. Effects of genotype on the response of *Populus-tremuloides* Michx to ozone and nitrogen deposition. *Water, Air, and Soil Pollution*. 62(3-4): 189-199.
- Kessler, K.J. 1989. Some perspectives on oak decline in the 80's. Preprint for the seventh central hardwood forest conference; [Year unknown] March 5-8; Carbondale, IL. Carbondale, IL: Southern Illinois University: [Page numbers unknown].
- Lane, C.J. 1991. Formation of sugar maple (*Acer saccharum* Marsh.) tree rings as affected by climate. Houghton, MI: Michigan Technological University, School of Forestry and Natural Resources. 55 p. M.S. thesis.
- Lane, C.J.; Reed, D.D.; Mroz, G.D.; Liechty, H.O. 1993. Width of sugar maple (*Acer saccharum*) tree rings as affected by climate. *Canadian Journal of Forest Research*. 23: 2370-2375.
- Liechty, H.O.; Burton, A.J.; Jurgensen, M.F.; Mroz, G.D.; Pregitzer, K.; Reed, D.D.; Richter, D.D.; Stottlemeyer, J.R.; Witter, J.A. 1988. Relationships of throughfall chemistry to precipitation in six northern hardwood stands along a sulfate deposition gradient. In: *Proceedings of acidic deposition and forest decline: an international symposium*; 1988 October 20-21; Rochester, NY. Syracuse, NY: State University of New York, College of Environmental Science and Forestry: [Page numbers unknown].
- Liechty, H.O.; Mroz, G.D. 1991. Effects of collection interval on quality and quantity of throughfall samples in two northern hardwood stands. *Journal of Environmental Quality*. 20(3): 588-590.

- Liechty, H.O.; Reed, D.D.; Mroz, G.D.; Jurgensen, M.F. 1990. Comparison of cation leaching in five northern hardwood stands along an air pollution gradient using a throughfall modeling approach. In: Proceedings of the 19th IUFRO World Congress, Division I; 1990 August 5-11; Montreal, Quebec. [Place of publication unknown]: IUFRO. 1: 295-306.
- Long, R.P. 1990. Lichen studies along a wet sulfate deposition gradient in Pennsylvania. In: Lynch, J.A.; Corbett, E.S.; Grimm, J.W., eds. Proceedings of the symposium of atmospheric deposition in Pennsylvania: a critical assessment; 1989 September 11-14; State College, PA. State College, PA: Pennsylvania State University, ERRI: 129-132.
- Long, R.P.; McClenahan, J.R. 1990. Red oak (*Quercus rubra* L.) growth trends along an atmospheric deposition gradient in Pennsylvania. In: Bongarten, B.C.; Dougherty, P.M.; Teskey, R.O., eds. Proceedings, 11th North American Forest Biology Workshop; 1990 June 13-15; Athens, GA. Athens, GA: University of Georgia, School of Natural Resources: 10. Abstract.
- Long, R.P.; McClenahan, J.R. 1990. Soil chemical variability along an atmospheric deposition gradient in Pennsylvania. In: Bongarten, B.C.; Dougherty, P.M.; Teskey, R.O., eds. Proceedings, 11th North American Forest Biology Workshop; 1990 June 13-15; Athens, GA. Athens, GA: University of Georgia, School of Natural Resources: 83. Abstract.
- Long, R.P., McClenahan, J.R.; Dwire, K.A. 1991. Selecting ecologically analogous forest stands: a rigorous method for studies of atmospheric deposition effects. OARDC Res. Circular 293. Wooster, OH: OARDC. 37 p. March issue.
- Lynch, J.A. 1990. Spatial and temporal variability in atmospheric deposition: a Pennsylvania prospectus. In: Lynch, J.A.; Corbet, E.S.; Grimm, J.W., eds. Proceedings of the symposium of atmospheric deposition in Pennsylvania: a critical assessment; 1989 September 11-14; State College, PA. State College, PA: Pennsylvania State University, ERRI: 50-62.
- Lynch, J.A.; Corbett, E.S.; Grimm, J.W., eds. 1990. Proceedings of a symposium: atmospheric deposition in Pennsylvania: a critical assessment; 1989 September 11-14; State College, PA. State College, PA: Pennsylvania State University, ERRI. 182 p.
- MacDonald, N.W.; Burton, A.J.; Jurgensen, M.F.; McLaughlin, J.W.; Mroz, G.D. 1991. Variation in forest soil properties along a Great Lakes air pollution gradient. Soil Science Society of America Journal. 55: 1709-1715.
- MacDonald, N.W.; Burton, A.J.; Liechty, H.O.; Witter, J.A.; Pregitzer, K.S.; Mroz, G.D.; Richter, D.D. 1992. Ion leaching in forest ecosystems along a Great Lakes air pollution gradient. Journal of Environmental Quality. 21: 614-623.
- McLaughlin, J.W. Sugar maple seedling nutrition and growth along an acid deposition gradient in Michigan. Houghton, MI: Michigan Technological University, School of Forestry and Wood Products. Ph.D. dissertation.

-
- McClenahan, J.R. 1990. Overview of atmospheric deposition impacts on forest resources: nature of impacts and state knowledge. In: Lynch, J.A.; Corbett, E.S.; Grimm, J.W., eds. Proceedings of the symposium on atmospheric deposition in Pennsylvania: a critical assessment; 1989 September 11-14; State College, PA. State College, PA: Pennsylvania State University, ERRI: 114-126.
- McClenahan, J.R.; Long, Robert P. 1993. Height growth of northern red oak in relation to site and atmospheric deposition in Pennsylvania. *Environmental Pollution*. 80: 105-114.
- McClenahan, J.R.; Vimmerstedt, J.P.; Scherzer, A.A. 1989. Elemental concentrations in tree rings by PIXE: statistical variability, mobility, and effects of altered soil chemistry. *Canadian Journal of Forest Research*. 19: 880-888.
- McClenahan, James R.; Long, Robert P. 1993. Height growth of northern red oak in relation to site and atmospheric deposition in Pennsylvania. *Environmental Pollution*. 80(2): 105-114.
- McCormick, L.H. 1990. Mineral content of red maple sap across a sulfate deposition gradient in Pennsylvania. In: Lynch, J.A.; Corbett, E.S.; Grimm, J.W., eds. Proceedings of the symposium of atmospheric deposition in Pennsylvania: a critical assessment; 1989 September 11-14; State College, PA. State College, PA: Pennsylvania State University, ERRI: 124-125.
- McCormick, L.H. 1988. Variations in mineral content of red maple sap across a sulfate deposition gradient. In: Proceedings of acidic deposition and forest decline: an international symposium; 1988 October 20-21; Rochester, NY. Syracuse, NY: State University of New York, College of Environmental Science and Forestry: [Page numbers unknown].
- Millers, Imants; Allen, Douglas C.; Lachance, Denis. 1992. Sugar maple crown conditions improve between 1988 and 1990. NA-TP-03-92. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Area State and Private Forestry; and Forestry Canada. [Brochure].
- Millers, Imants; Lechance, Denis; Burkman, William G.; Allen, Douglas C. 1991. North American Sugar Maple Decline Project: organization and field methods. Gen. Tech. Rep. NE-154. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station. 26 p.
- Millers, Imants; Shriner, David S.; Rizzo, David. 1989. History of hardwood decline in the eastern United States. Gen. Tech. Rep. NE-126. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station and U.S. Environmental Protection Agency. 75 p.
- Mroz, G.D.; Reed, D.D. 1991. Forest soil sampling efficiency: Matching laboratory analyses and field sampling procedures. *Soil Science Society of America Journal*. 55(5): 1413-1416.
- Mroz, G.D.; Reed, D.D.; Witter, J.A.; Pregitzer, K.S.; Jurgensen, M.F.; Liechty, H.O.; Burton, A.J.; Stottlemeyer, J.R.; MacDonald, N.W.; Zak, D.R.; Hua, O.O. 1990. Effects of an air pollution gradient on northern hardwood forests in the Northern Great Lakes Region: part 2 - nutrient cycling and forest productivity. In: Proceedings of the International Congress on Forest Decline Research: state of knowledge and perspectives; 1989 October 2-6; Friedrichshafen, Lake Constance, Federal Republic of Germany. ISBN 3-923704-05-4. Kerntorschungszentrum: [Page numbers unknown].

-
- Nash, B.L. 1990. Disease and insect survey across a sulfate deposition gradient in North Central Pennsylvania. In: Lynch, J.A.; Corbett, E.S.; Grimm, J.W., eds. Proceedings of the symposium on atmospheric deposition in Pennsylvania: a critical assessment; 1989 September 11-14; State College, PA. State College, PA: Pennsylvania State University, ERRI: [Page numbers unknown].
- Nash, Bruce L.; Davis, Donald D.; Skelly, John M. 1992. Forest health along a wet sulfate/pH deposition gradient in north-central Pennsylvania. *Environmental Toxicology and Chemistry*. 11(8): 1095-1104.
- Noble, R.D.; Martin, J.L.; Jensen, K.F., eds. 1989. Air pollution effects on vegetation including forest ecosystems. Proceedings of the 2nd US-USSR symposium; 1988 September 13-25; Corvallis, OR, Raleigh, NC, and Gatlinburg, TN. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station. 311 p.
- Ouyang, H. 1990. The effects of acid deposition on nitrogen mineralization in forest soils of the Great Lakes region. Houghton, MI: Michigan Technological University, School of Forestry and Wood Products. 66 p. M.S. thesis.
- Pregitzer, K.S.; Burton, A.J. 1991. Sugar maple seed production and nitrogen in litterfall. *Canadian Journal of Forest Research*. 21: 1148-1153.
- Pregitzer, Kurt S.; Burton, Andrew J.; Mroz, Glenn D.; Liechty, Hal O.; MacDonald, Neil W. 1992. Foliar sulfur and nitrogen along an 800-km pollution gradient. *Canadian Journal of Forest Research - Journal Canadien de La Recherche Forestiere*. 22(11): 1761-1769.
- Randlett, D.; Zak, D.R.; MacDonald, N.W. 1992. Sulfate adsorption and microbial immobilization in northern hardwood forests along an atmospheric deposition gradient. *Canadian Journal of Forest Research*. 22(12): 1843-1850.
- Randlett, Dana L.; Zak, Donald R.; MacDonald, Neil W. 1992. Sulfate adsorption and microbial immobilization in northern hardwood forests along an atmospheric deposition gradient. *Canadian Journal of Forest Research - Journal Canadien de La Recherche Forestiere*. 22(12): 1843-1850.
- Reed, D.D. 1990. Investigating the effects of regional air pollution on forest ecosystem productivity. In: Proceedings of the 1990 annual meeting of the Society of American Foresters; [Date unknown]; Washington, DC. [Place of publication unknown]: Society of American Foresters: 107-110.
- Reed, D.D.; Liechty, H.O.; Burton, A.J. 1989. A simple procedure for mapping tree locations in forest stands. *Forest Science*. 35: 657-662.
- Simini, M.; Skelly, J.M.; Davis, D.D. 1990. Response of forest tree seedlings to varying doses of ozone using open-top chambers in North Central Pennsylvania. In: Lynch, J.A.; Corbett, E.S.; Grimm, J.W., eds. Proceedings of the symposium on atmospheric deposition in Pennsylvania: a critical assessment; 1989 September 11-14; State College, PA. State College, PA: Pennsylvania State University, ERRI: 128.

Witter, J.A.; Mroz, G.D.; Pregitzer, K.S.; Burton, A.J.; Jurgensen, M.F.; Karnosky, D.F.; Liechty, H.O.; MacDonald, N.W.; Reed, D.D.; Stottlemyer, J.R.; Zak, D.R. 1990. Effects of an air pollution gradient on northern hardwood forests in the Northern Great Lakes Region: part 1 - overview. In: Proceedings of the International Congress on Forest Decline Research: state of knowledge and perspectives; 1989 October 2-6; Friedrichshafen, Lake Constance, Federal Republic of Germany. ISBN 3-923704-05-4. Kerntorschungszentrum: [Page numbers unknown].

National Program Management

- Carey, A.E.; Saint, C.G.; Blair, R. 1988. The Forest Response Program: atmospheric deposition research in U.S. forests. In: Hertel, G.D., tech. coord. Effects of atmospheric pollutants on the spruce-fir forests of the eastern United States and the Federal Republic of Germany. Proceedings of the United States/Federal Republic of Germany research symposium; 1987 October 19-23; Burlington, VT. Gen. Tech. Rep. NE-120. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station: 1-4.
- Hertel, G.D.; Adams, M.B.; Andrus, S.; et al. 1990. The effects of acid deposition and ozone on forest tree species: results of the Forest Response Program. Paper No. 90-187.1. Pittsburgh, PA: Air & Waste Management Association. 30 p. [Preprint for the 83rd Annual Meeting, June 24-29, 1990].
- Hertel, G.D.; Brandt, J. 1990. Waldschaeden-forschungsprogramm forschung zur athmosphaerischen deposition in amerikanischten waeldern. In: International congress on forest decline research: State of knowledge and perspectives; 1989 October 2-6; Lake Constance, Federal Republic of Germany. Lectures Volume II, ISBN 3-923704-05-4. Kerntorschungszentru: 905-912.
- Hertel, G.D.; Eagar, C.; Medlarz, S.A.; McFadden, M.W. 1993. The effects of acidic deposition and ozone on forest tree species in the eastern United States. [Name of larger work]. New York: Springer-Verlag: 54-65.
- Hertel, G.D.; McKinney-McNeal, E. 1991. The Forest Response Program: research on the effects of acidic deposition and ozone. Agric. Info. Bull. No. 622. Washington, DC: U.S Department of Agriculture, Forest Service. 19 p.
- Luoma, J.R.; Joyner, K.C. 1990. Air pollution and forest decline: is there a link? Agric. Info. Bull. No. 595. Washington, DC: U.S. Department of Agriculture, Forest Service. 13 p. [Stubbs, H.S., Project Coordinator].
- U.S. Department of Agriculture, Forest Service. 1991. Air pollution and forest decline: is there a link? [Publication information unknown]. [Number of pages unknown].
-

National Vegetation Survey

- Anderson, R.L.; Brown, H.D.; Chevone, B.I.; McCartney, T.C. 1988. Occurrence of air pollution symptoms (needle tip necrosis and chlorotic mottling) on eastern white pine in the southern Appalachian Mountains. *Plant Disease*. 72: 130-132.
- Barnard, J.E. 1986. A survey to assess the effects of atmospheric deposition on forest vegetation. In: Schmid-Hass, P., ed. *Inventorying and monitoring endangered forests. Proceedings of the International Union of Forestry Research Organizations conference; 1985 August 19-24; Zurich, Switzerland*. Birmensdorf, Switzerland: Swiss Federal Institute of Forest Research, CH-8903: 197-199.
- Barnard, J.E. 1989. Large-scale monitoring. In: *Biologic markers of air pollution stress and damage in forests; 1989 April 23-28; Little Switzerland, NC*. Washington, DC: National Academy Press: 57-62.
- Barnard, J.E. 1986. National Vegetation Survey/Forest Response Program. In: *Proceedings of the fourth regional technical conference, atmospheric deposition and forest productivity, Appalachian Society of American Foresters; 1986 January 29-31; Raleigh, NC*. SAF 86-06. Blacksburg, VA: Society of American Foresters: 93-97.
- Barnard, J.E. 1987. Review of the state of the art of surveying forest productivity and condition over wide regions for the purpose of long term monitoring of forest health. In: Bicknell, S.H., ed. *Proceedings of the California Forest Response Program Planning Conference; 1987 February 22-24; Pacific Grove, CA*. Arcata, CA: Humboldt State University Foundation: 227 p.
- Barnard, J.E. 1987. Status report on the National Vegetation Survey. In: *Proceedings of workshop on methodologies, international cooperative program on assessment and monitoring of air pollution effects on forests, PCC-East; [Year unknown] May 25-26; Usti nad Labem, Czechoslovakia*. Prague, Czechoslovakia: Institute for Environment and Utilization of National Resources, U Michelskeho lesa 366, 140 00 Praha 4-Krc, Czechoslovakia: 83-86.
- Barnard, J.E.; Myers, W.; Pearce, J.; Ramsey, F.; Siisenwine, M.M.; Smith, W.H. 1985. Surveys for monitoring changes and trends in renewable resources: forests and marine fisheries. *American Statistician*. 39: 363-373.
- Barnard, J.E.; Scott, C.T. 1988. Changes in tree growth rates in Vermont. Res. Note SE-350. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station. 6 p.
- Bechtold, W.A.; Ruark, G.A. 1988. Structure of pine stands in the Southeast. Res. Pap. SE-74. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station. 185 p.
- Brockhaus, J.; Campbell, M.; Bruck, R.; Khorram, S. 1989. Analysis of forest decline in the southern Appalachians with TM data. In: *Proceedings of the 1989 annual convention of the American Society of Photogrammetry and Remote Sensing; 1989 April 2-7; Baltimore, MD*. [Publication information unknown]: 227-236.

-
- Brooks, R.T. 1989. An analysis of regional forest growth and atmospheric deposition patterns, Pennsylvania, (USA). In: Bucher, J.; Bucher-Wallin, I., eds. Proceedings of the International Union of Forestry Research Organizations conference on air pollution and forest decline; 1988 October 2-8; Interlaken, Switzerland. Birmensdorf, Switzerland: IUFRO: 283-288.
- Campbell, M.; Brockhaus, J.; Khorram, S.; Bruck, R.I. 1989. The effect of field plot location errors in TM data on forest decline model development. In: Proceedings of the 1989 annual convention of the American Society of Photogrammetry and Remote Sensing; 1989 April 2-7; Baltimore, MD. [Publication information unknown]: 206-216.
- Ciesla, W.M.; Wilson, E.T.; Eav, B.B.; Ward, J.D. 1986. Identification of red spruce and Fraser fir on large scale cir aerial photos. Rep. No. 87-1. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Forest Pest Management Methods Application Group. 21 p.
- Cook, E.R. 1988. A tree-ring analysis of red spruce in the southern Appalachian Mountains. In: Van Deusen, P.C., ed. Analyses of Smoky Mountain red spruce tree-ring data. Gen. Tech. Rep. SO-69. New Orleans, LA: U.S. Department of Agriculture, Forest Service, Southern Forest Experiment Station: 6-20.
- David, M.B. 1988. Use of loss-on-ignition to assess soil organic carbon in forest soils. *Communications in Soil Science and Plant Analysis*. 19: 1593-1599.
- David, M.B.; Grigal, D.F.; Ohmann, L.F.; Gertner, G.Z. 1988. Sulfur, carbon, and nitrogen relationships in forest soils across the Northern Great Lakes States as affected by atmospheric deposition and vegetation. *Canadian Journal of Forest Research*. 18: 1386-1391.
- David, M.B.; Mitchell, M.J.; Aldcorn, D.; Harrison, R.B. 1989. Analysis of sulfur in soil plant and sediment materials: sample handling and use of an automated analyzer. *Soil Biology and Biochemistry*. 21: 119-123.
- de Steiguer, J.E. 1985. Acid deposition impacts on eastern forests: a research response. In: Proceedings of the 13th annual hardwood symposium; [Year unknown] May 22-24; High Point, NC. Asheville, NC: Hardwood Research Council: 27-34.
- de Steiguer, J.E. 1986. Research targets acid rain for effects on trees. *Forest Farmer*. 45: 28-29.
- Defeo, N.J.; Rock, B.N.; Vogelmann, J.E. 1988. Detection of forest damage on Whiteface Mountain, New York, using landsat thematic mapper data. In: Proceedings of the 21st international symposium on remote sensing of environment; 1987 October 26-30; Ann Arbor, MI. [Publication information unknown]: 835-842.
- Dell, T.R. 1987. Southern forest growth trends: air pollution influence studies and tree-ring analysis. In: Jacoby Jr., G.C.; Hornbeck, J.W., eds. Proceedings of the international symposium on ecological aspects of tree-ring analysis; 1986 August 17-21; Tarrytown, NY. Palisades, NY: Tree-Ring Laboratory, Lamont-Doherty Geological Observatory, CONF-8608144: 353-359.

-
- Dell, T.R. 1988. Southern forest growth trend analyses to evaluate air pollution influences - a progress report. In: Ek, A.R.; Shifley, S.R.; Burk, T.E., eds. Proceedings of the International Union of Forestry Research Organizations forest growth modeling and prediction conference; 1987 August 23-27; Minneapolis, MN. Gen. Tech. Rep. NE-120. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station. 443-449.
- Dell, T.R.; Krovetz, J.; Shoulders, E.E. 1989. Progress on shortleaf plantation, data pool and growth predictions. In: Miller, J.H., ed. Proceedings of the fifth biennial southern silviculture research conference; 1988 November 1-3; Memphis, TN. Gen. Tech. Rep. SO-74. New Orleans, LA: U.S. Department of Agriculture, Forest Service, Southern Forest Experiment Station: 441-445.
- Federer, C.A.; Hornbeck, J.W. 1987. Expected decrease in diameter growth of even-aged red spruce. Canadian Journal of Forest Research. 17: 266-269.
- Federer, C.A.; Hornbeck, J.W. 1987. Red spruce diameter growth and weibull functions for even-aged stand development. In: Jacoby Jr., G.C.; Hornbeck, J.W., eds. Proceedings of the international symposium on ecological aspects of tree-ring analysis; 1986 August 17-21; Tarrytown, NY. Palisades, NY: Tree-Ring Laboratory, Lamont-Doherty Geological Observatory, CONF-8608144: 18-25.
- Federer, C.A.; Hornbeck, J.W.; Smith, R.B. 1988. Regional dendrochronologies of red spruce and other species in New England. In: Hertel, G.D., tech. coord. Effects of atmospheric pollutants on the spruce-fir forests of the eastern United States and the Federal Republic of Germany. Proceedings of the United States/Federal Republic of Germany research symposium; 1987 October 19-23; Burlington, VT. Gen. Tech. Rep. NE-120. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station: 285-290.
- Federer, C.A.; Tritton, L.M.; Hornbeck, J.W.; Smith, R.B. 1989. Physiologically based dendroclimate models for effects of weather on red spruce diameter growth. Agricultural and Forest Meteorology. 46: 159-172.
- Franklin, J.F.; Shugart, H.H.; Harmon, M.E. 1987. Tree death as an ecological process. Bioscience. 37: 550-556.
- Geron, C.D.; Ruark, G.A. 1988. Comparison of constant and variable allometric ratios for predicting foliar biomass of various tree species. Canadian Journal of Forest Research. 18: 1298-1304.
- Grigal, D.F.; Brovold, S.L.; Nord, W.S.; Ohmann, L.F. 1989. Bulk density of surface soils and peat in the North Central United States. Canadian Journal of Soil Science. 69: 895-900.
- Grigal, D.F.; Ohmann, L.F. 1989. Spatial patterns in elemental concentrations of the forest floor across the North Central United States. Journal of Environmental Quality. 18: 368-373.
- Groton, E.O.; Eagar, C. 1988. Southern Appalachian red spruce-Fraser fir forests. In: Van Deusen, P.C., ed. Analyses of Smoky Mountain red spruce tree-ring data. Gen. Tech. Rep. SO-69. New Orleans, LA: U.S. Department of Agriculture, Forest Service, Southern Forest Experiment Station: 2-6.

-
- Holdaway, M.R. 1988. The relationship between tree diameter growth and climate in the Lake States. In: Ek, A.R.; Shifley, S.R.; Burk, T.E., eds. Proceedings of the International Union of Forestry Research Organizations forest growth modeling and prediction conference; 1987 August 23-27; Minneapolis, MN. Gen. Tech. Rep. NC-120. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station: 490-496.
- Hornbeck, J.W. 1987. Growth patterns of red oak and red sugar maple relative to atmospheric deposition. In: Hay, R.L.; Woods, F.W.; DeSelm, H., eds. Proceedings of the sixth central hardwood conference; 1987 February 24-26; Knoxville, TN. Knoxville, TN: University of Tennessee, Department of Forestry, Wildlife and Fisheries: 227-282.
- Hornbeck, J.W. 1989. Using tree rings to evaluate acid deposition and other causes of forest decline. In: Proceedings, Annual Convention of Society of American Foresters; 1988 September; Rochester NY. Rochester, NY: SAF: 72-74.
- Hornbeck, J.W., ed. 1987. Proceedings of the international symposium on ecological aspects of tree-ring analysis; 1986 August 17-21; Tarrytown, NY. Palisades, NY: Tree-Ring Laboratory, Lamont-Doherty Geological Observatory, CONF-8608144. 716 p.
- Hornbeck, J.W.; Federer, C.A. 1987. A forestry approach to tree-rings and red spruce growth decline. In: Lucier, A.A., ed. Tree-rings and forest mensuration: how can they document trends in forest health and productivity. Tech. Bull. 523. New York City: National Council of the Paper Industry for Air and Stream Improvement: 32-33.
- Hornbeck, J.W.; Smith, R.B. 1985. Documentation of red spruce growth decline. Canadian Journal of Forest Research. 15: 1199-1201.
- Hornbeck, J.W.; Smith, R.B.; Federer, C.A. 1987. Extended growth decreases in New England are limited to red spruce and balsam fir. In: Jacoby Jr., G.C.; Hornbeck, J.W., eds. Proceedings of the international symposium on ecological aspects of tree-ring analysis; 1986 August 17-21; Tarrytown, NY. Palisades, NY: Tree-Ring Laboratory, Lamont-Doherty Geological Observatory, CONF-8608144: 38-44.
- Hornbeck, J.W.; Smith, R.B.; Federer, C.A. 1986. Growth decline in red spruce and balsam fir relative to natural processes. Water, Air, and Soil Pollution. 31: 425-430.
- Hornbeck, J.W.; Smith, R.B.; Federer, C.A. 1988. Growth trends in 10 species of trees in New England, 1950-1980. Canadian Journal of Forest Research. 18: 1337-1340.
- Jacoby Jr., G.C.; Hornbeck, J.W., eds. 1987. Proceedings of the international symposium on ecological aspects of tree-ring analysis; 1986 August 17-21; Tarrytown, NY. Palisades, NY: Tree-Ring Laboratory, Lamont-Doherty Geological Observatory, CONF-8608144. 716 p.

-
- Ke, J.; Skelly, J.M. 1989. An evaluation of Norway spruce in Northeastern United States. In: Bucher, J.; Bucher-Wallin, I., eds. Proceedings of the International Union of Forestry Research Organizations conference on air pollution and forest decline; 1988 October 2-8; Interlaken, Switzerland. Birmensdorf, Switzerland: IUFRO: 55-60.
- Ke, Jing; Skelly, John M. 1990/1991. Foliar symptoms on Norway spruce and relationships to magnesium deficiencies. *Water, Air, and Soil Pollution*. 54: 75-90.
- Knight, H.A. 1987. The pine decline. *Journal of Forestry*. 85: 25-28.
- Khorram, Siamak; Brockhaus, John A.; Bruck, Robert I.; Campbell, Michael V. 1990. Modeling and multitemporal evaluation of forest decline with Landsat TM digital data. *IEEE transactions on geo-science and remote sensing*. 28(4): 746-748.
- Krusic, P.; Kenny, M.; Hornbeck, J.W. 1987. Preparing increment cores for ring width measurements. *Northern Journal of Applied Forestry*. 4: 104-105.
- Lappi, J.; Bailey, R.L. 1987. Estimation of the diameter increment function or other tree relations using angle-count samples. *Forest Science*. 33: 725-739.
- Leblanc, David C. 1992. Spatial and temporal variation in the prevalence of growth decline in red spruce populations of the Northeastern United States. *Canadian Journal of Forest Research - Journal Canadien de La Recherche Forestiere*. 22(9): 1351-1363.
- Lefohn, A.S.; Knudsen, H.P.; McEvoy Jr., L.R. 1988. The use of kriging to monthly ozone exposure parameters for the southeastern United States. *Environmental Pollution*. 53: 27-42.
- Lie, Chiun-Ming; Leuschner, W.A.; Burkhart, H.E. 1989. A production function analysis of loblolly pine yield equations. *Forest Science*. 35: 775-788.
- Manes, S. 1986. Acid deposition: a content analysis of North American newspapers. Clemson, SC: Clemson University. 97 p. M.S. thesis.
- McMinn, J.W. 1986. Derivation of prism factors for quantifying tree crown competition. Res. Note SE-341. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station. 4 p.
- Miller-Weeks, M.; Millers, I.; Cooke, R. 1988. Description of crown symptoms on red spruce (*Picea rubens* Sarg.) and balsam fir (*Abies balsamea* (L.) Mill.) in the northeastern United States-a progress report. In: Hertel, G.D., tech. coord. Effects of atmospheric pollutants on the spruce-fir forests of the eastern United States and the Federal Republic of Germany. Proceedings of the United States/Federal Republic of Germany research symposium; 1987 October 19-23; Burlington, VT. Gen. Tech. Rep. NE-120. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station: 199-210.

-
- Nance, W.L.; Grisson, J.E.; Nelson, C.D.; Burkhart, H.E., Webb, C.D. 1989. Simulating the effect of atmospheric deposition on loblolly pine stands. In: Miller, J.H., ed. Proceedings of the fifth biennial southern silvicultural research conference; 1988 November 1-3; Memphis, TN. Gen. Tech. Rep. SO-74. New Orleans, LA: U.S. Department of Agriculture, Forest Service, Southern Forest Experiment Station: 33-42.
- Ohmann, L.F.; Grigal, D.F.; Brovold, S.L. 1989. Physical characteristics of study plots across a Lake States acidic deposition gradient. Res. Bull. NC-110. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Experiment Station. 47 p.
- Ohmann, L.F.; Shifley, S.R. 1989. Relations between forest conditions and atmospheric deposition along the northwestern Minnesota-to-southeastern Michigan deposition gradient. In: Noble, R.D.; Martin, J.L.; Jensen, K.F., eds. Proceedings of the 2nd US-USSR symposium on air pollution effects on vegetation including forest ecosystems; 1988 September 13-25; Corvallis, OR, Raleigh, NC, and Gatlinburg, TN. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station: 225-232.
- Ord, J.K.; Derr, J.A. 1988. Utilizing time series model and spatial analysis of forecast residuals for tree analysis of red spruce. In: Van Duesen, P.C., ed. Analysis of Smoky Mountain red spruce tree-ring data. Gen. Tech. Rep. SO-69. New Orleans, LA: U.S. Department of Agriculture, Forest Service, Southern Forest Experiment Station: 21-39.
- Pye, J.M. 1988. Impact of ozone on the growth and yield of trees: a review. *Journal of Environmental Quality*. 17: 347-360.
- Ritters, K.H.; Barnard, J.E. 1989. Criteria and evaluating indicators of forest health. In: Proceedings of the international conference and workshop on global natural resource monitoring and assessments: preparing for the 21st century; 1989 September 24-30; Venice, Italy: [Page numbers unknown].
- Rock, B.N.; Vogelmann, J.E.; Defeo, N.J. 1988. Vegetation survey pilot study: assessing forest damage on Whiteface Mountain, NY, using remote sensing techniques. In: Hertel, G.D., tech. coord. Effects of atmospheric pollutants on the spruce-fir forests of the eastern United States and the Federal Republic of Germany. Proceedings of the eastern United States/Federal Republic of Germany research symposium; 1987 October 19-23; Burlington, VT. Gen Tech. Rep. NE-120. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station: 263-270.
- Ruark, G.A. 1988. Estimating crown biomass of shade tolerant and intolerant tree species with a variable allometric ration. In: Ek, A.R.; Shifley, S.R.; Burk, T.E., eds. Proceedings of the International Union of Research Organizations forest growth modeling and prediction conference; 1987 August 23-27; Minneapolis, MN. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station: 1045-1052.
- Schmid-Haas, P. 1989. Do the observed needle losses reduce increments? In: Bucher, J.; Bucher-Wallin, I., eds. Proceedings of the International Union of Forestry Research Organizations conference on air pollution and forest decline; 1988 October 2-8; Interlaken, Switzerland. Birmensdorf, Switzerland: IUFRO: 271-276.

Sheffield, R.M.; Cost, N.D. 1987. Behind the decline. *Journal of Forestry*. 85: 29-33.

Sheffield R.M.; Cost, N.D.; Bechtold, W.A.; McClure, J.P. 1985. Pine growth reductions in the South-east. *Rcs. Bull. SE-83*. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station. 112 p.

Shifley, S.R. 1988. Analysis and modeling of growth trends along a sulfate deposition gradient in the North Central United States. In: Ek, A.R.; Shifley, S.R.; Burk, T.E., eds. *Proceedings of the International Union of Forestry Research Organizations forest growth modeling and prediction conference; 1987 August 23-27; Minneapolis, MN*. Gen. Tech. Rep. NC-120. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station: 506-513.

Shifley, S.R. 1987. Evaluation of Lake States forest conditions along a sulfate deposition gradient. In: Lucier, A.A., ed. *Tree-rings and forest mensuration: how can they document trends in forest health and productivity*. Tech. Bull. 523. New York City: National Council of the Paper Industry for Air and Stream Improvements: 33-36.

Skelly, J.M.; Davis, D.D.; Merrill, W.; Cameron, E.A.; Brown, H.D.; Drummond, D.B.; Dochinger, L.S., eds. 1987. *Diagnosing injury to eastern forest trees: a manual for identifying damage caused by air pollution, pathogens, insects, and abiotic stresses*. University Park, PA: Pennsylvania State University, College of Agriculture. 120 p.

Skelly, J.M.; Ke, J.; Karasevicz, D.M. 1988. A preliminary report on observations of the health of Norway spruce in three Northeastern States. In: Hertel, G.D., tech. coord. *Effects of atmospheric pollutants on the spruce-fir forests of the eastern United States and the Federal Republic of Germany. Proceedings of the United States/Federal Republic of Germany research symposium; 1987 October 19-23; Burlington, VT*. Gen. Tech. Rep. NE-120. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station: 257-262.

Smith, R.B.; Hornbeck, J.W.; Federer, C.A. 1986. What is happening to New Hampshire's red spruce? *Forest Notes*. Fall 27: 32.

Smith, W.R. 1989. An analysis of survivor basal area growth across the range of loblolly pine. In: Miller, J.H., ed. *Proceedings of the fifth biennial southern silvicultural research conference; 1988 November 1-3; Memphis, TN*. Gen. Tech. Rep. SO-74. New Orleans, LA: U.S. Department of Agriculture, Forest Service, Southern Forest Experiment Station: 43-49.

Solomon, D.S. 1986. Annual increment of stressed spruce and fir trees. In: Solomon, D.S.; Branns, T.B., eds. *Environmental influences on tree and stand increment. Proceedings of the International Union of Forestry Research Organizations mensuration workshop; 1985 September 23-27; Durham, NH*. Misc. Publ. 691. Orono, ME: Maine Agricultural Experiment Station, University of Maine: 49-56.

- Solomon, D.S.; Hayslett Jr., H.T. 1986. Predicted foliage production for defoliated balsam trees using a matrix model. In: Solomon, D.S.; Branns, T.B., eds. Environmental influences on tree and stand increment. Proceedings of the International Union of Forestry Research Organizations mensuration growth and yield and instruments and methods in forest mensuration workshop; 1985 September 23-27; Durham, NH. Misc. Publ. 691. Orono, ME: Maine Agricultural Experiment Station, University of Maine: 138-145.
- Tate, P.J. 1987. Sensitivity of two forest growth models to simulated pollution stress modifications. Blacksburg, VA: Virginia Polytechnic Institute and State University. 95 p. M.S. thesis.
- Taylor, R.A.J. 1988. A fractal approach to analysis of tree-ring increments. In: Van Deusen, P.C., ed. Analysis of Smoky Mountain red spruce tree-ring data. Gen. Tech. Rep. SO-69. New Orleans, LA: U.S. Department of Agriculture, Forest Service, Southern Forest Experiment Station: 40-56.
- Valentine, H.T.; Gregorie, T.G.; Furnival, G.M.; Solomon, D.S. 1986. Unbiased estimate of bole increment. In: Solomon, D.S.; Brann, T.B., eds. Environmental influences on tree and stand increment. Proceeds of the International Union of Forestry Research Organizations mensuration growth and yield and instrument and methods in forest mensuration workshop; 1985 September 23-27; Durham, NH. Misc. Publ. 691. Orono, ME: Maine Agricultural Experiment Station, University of Maine: 67-73.
- Van Deusen, P.C. 1988. Detecting effects of stand dynamics with tree-ring data. In: Ek, A.R.; Shifley, S.R.; Burk, T.E., eds. Proceedings of the International Union of Forestry Research Organizations forest growth modeling and prediction conference; 1987 August 23-27; Minneapolis, MN. Gen. Tech. Rep. NC-120. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station: 521-529.
- Van Deusen, P.C. 1988. Red spruce tree-ring analysis using a kalman filter. In: Van Deusen, P.C., ed. Analysis of Smoky Mountain red spruce tree-ring data. Gen. Tech. Rep. SO-69. New Orleans, LA: U.S. Department of Agriculture, Forest Service, Southern Forest Experiment Station: 57-67.
- Van Deusen, P.C. 1987. Some applications of the kalman filter to tree-ring analysis. In: Jacoby, G.C.; Hornbeck, J.W., eds. Proceedings of the international symposium on ecological aspects of tree-ring analysis; 1986 August 17-21; Tarrytown, NY. Palisades, NY: Tree-Ring Laboratory, Lamont-Doherty Geological Observatory, CONF-860814: 556-578.
- Van Deusen, P.C. 1987. Southern red spruce tree-ring analysis. In: Lucier, A.A., ed. Tree-rings and forest mensuration: How can they document trends in forest health and productivity. Tech. Bull. 523. [Place of publication unknown]: National Council of the Paper Industry for Air and Stream Improvement: 45-57.
- Van Deusen, P.C. 1987. Testing for stand dynamics effects on red spruce growth trends. Canadian Journal of Forest Research. 17: 1487-1495.

-
- Van Deusen, P.C., ed. 1988. Analysis of Smoky Mountain red spruce tree-ring data. Gen. Tech. Rep. SO-69. New Orleans, LA: U.S. Department of Agriculture, Forest Service, Southern Forest Experiment Station. 67 p.
- Van Deusen, P.C.; Barnard, J.E. 1990. Indicator plants in forest health surveys. In: Proceedings of the symposium on state of the art methodology of forest inventory; 1989 July 30-August 5; Syracuse, NY. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station: 364-368.
- Zahner, R. 1987. Evaluating drought impacts on the growth of southern pine forests. In: Lucier, A.A., ed. Tree-rings and forest mensuration: how can they document trends in forest health and productivity. Tech. Bull 523. New York City: National Council of the Paper Industry for Air and Stream Improvement: 37-45.
- Zahner, R. 1989. Tree-ring series related to stand and environmental factors in South Alabama longleaf pine stands. In: Miller, J.H., ed. Proceedings of the fifth biennial southern silvicultural research conference; 1988 November 1-3; Memphis, TN. Gen. Tech. Rep. SO-74. New Orleans, LA: U.S. Department of Agriculture, Forest Service, Southern Forest Experiment Station: 193-197.
- Zahner, R.; Myers, R.K. 1987. Assessing the impact of drought on forest health. In: Proceedings of the Society of American Foresters annual conference; 1986 October 5-8; Birmingham, AL. [Place of publication unknown]: Society of American Foresters: 227-234.
- Zahner, R.; Saucier, J.R. 1989. Twenty-five years of climate-related growth trends for natural stands of loblolly pine in Central Georgia. In: Miller, J.H., ed. Proceedings of the 5th biennial southern silvicultural research conference; 1988 November 1-3; Memphis, TN. Gen. Tech. Rep. SO-74. New Orleans, LA: U.S. Department of Agriculture, Forest Service, Southern Forest Experiment Station: 25-32.
- Zahner, R.; Saucier, J.R.; Myers, R.K. 1989. Tree-ring model interprets growth decline in natural stands of loblolly pine in the southeastern United States. Canadian Journal of Forest Research. 19(5): 612-621.
-

Quality Assurance Project

- Bailey, J.D. 1987. Quality assurance for forest ecosystem research. In: Bicknell, S.H., ed. Proceedings of the California Forest Response Program planning conference; 1987 February 22-24; Pacific Grove, CA. Arcata, CA: Humboldt State University Foundation: 111-118.
- Burkman, W.G.; Millers, I.; Lachance, D. 1990. Quality assurance aspects of the joint USA - Canada North American Sugar Maple Decline Project. In: Proceedings of the third annual ecological quality assurance workshop; [Year unknown] April 24-26; Burlington, Ontario. [Publication information unknown]: 83-97.
- Burkman, W.G.; Millers, I.; Lachance, D. 1991. Quality assurance/quality control implementation and evaluation in the North American Sugar Maple Decline Project. In: Burns, Denver P., tech. coord. Research management for the future; 1990 August 5-11; Montreal, PQ. Gen. Tech. Rep. NE-157. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station: 29-41.
- Cline, S.P.; Burkman, W.G. 1989. The role of quality assurance in ecological research programs. In: Bucher, J.; Bucher-Wallin, I., eds. Proceedings of the International Union of Forestry Research Organizations conference on air pollution and forest decline; 1988 October 2-8; Interlaken, Switzerland. Birmensdorf, Switzerland: IUFRO: 361-366.
- Cline, S.P.; Burkman, W.G.; Geron, C.D. 1989. Use of quality control procedure for assessing variation in measurements of forest canopy condition. In: Olson, R.K.; Lefohn, A.S., eds. Effects of air pollution on western forests. APCA Ser. TR-16. Pittsburgh, PA: Air & Waste Management Association: 379-394.
- Gregorie, T.G.; Zedaker, S.M.; Nicholas, N.S. 1990. Modeling relative error in stem basal area estimates. Canadian Journal of Forest Research. 20: 496-502.
- Huntington, T.G.; Johnson, A.H.; Schwartzmann, T.N. 1990. Mechanical vacuum extraction versus batch equilibration for estimation of exchangeable cations. Soil Science Society of America Journal. 54: 381-385.
- Medlarz, S.A. 1988. Quality assurance in the Spruce-Fir Research Cooperative. In: Hertel, G.D., tech. coord. Effects of atmospheric pollutants on the spruce-fir forest of the eastern United States and the Federal Republic of Germany. Proceedings of the United States/Federal Republic of Germany research symposium; 1987 October 19-23; Burlington, VT. Gen. Tech. Rep. NE-120. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station: 61-66.
- Mickler, R.A.; Medlarz, S. 1987. The role of quality assurance in national acid rain research in the U.S. Environmental Technology Letters. 8: 459-466.

Winjum, J.K. 1989. U.S. forest and atmospheric deposition. In: Noble, R.D.; Martin, J.L.; Jensen, K.F., eds. Proceedings of the US-USSR symposium on air pollution effects on vegetation including forest ecosystems; 1988 September 13-25; Corvallis, OR, Raleigh, NC, and Gatlinburg, TN. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station: 9-12.

Zedaker, S.M.; Nicholas, N.S. 1990. Quality assurance methods manual for forest site classification and field measurements. EPA/600/3-90/082. Corvallis, OR: U.S. Environmental Protection Agency, Environmental Research Laboratory. 46 p.

Southern Commercial Forest Research Cooperative

- Albaugh, Timothy J.; Allen, H. Lee; Kress, Lance W. 1991. Biomass - D²H relationships for young loblolly pine as affected by ozone. *Biomass and Bioenergy*. 1(3): 143-148.
- Albaugh, Timothy J.; Allen, H. Lee; Zarnoch, Stanley J.; Kress, Lance W. [In review] 1995. Ozone effects on vertical foliage distribution of young loblolly pine. *Water, Air, and Soil Pollution*.
- Albaugh, Timothy J.; Mowry, Fred L.; Kress, Lance W. 1992. A field chamber for testing air pollution effects on mature trees. *Journal of Environmental Quality*. 21(3): 476-485.
- Allen, Eric. 1988. Atmospheric exposure monitoring in the southern commercial forests: project status report. In: Carey, Ann; Blair, Roger; Saint, Chris, eds. *Forest Response Program annual meeting: project status report; 1988 February 22-26; Corpus Christi, TX*. Raleigh, NC: North Carolina State University, Atmospheric Impacts Research Program: 398-402. Vol. 2.
- Allen, Eric R.; Cabrera, Norman; Kim, Jo-Chun. 1994. Atmospheric deposition studies in rural forested areas of the southeastern United States. In: 87th annual meeting and exhibition, Air & Waste Management Association; 1994 June 19-24; Cincinnati, OH. Paper No. 94-WP-88.02. Pittsburgh, PA: Air & Waste Management Association. 15 p.
- Allen, Eric R.; Evans, Gary F. 1992. Ozone exposure characteristics at rural southern commercial forest sites. In: Berglund, Ronald L., ed. *Tropospheric ozone and the environment, 2: transactions; 1992 November 4-7; Atlanta, GA*. A&WMA Transactions Ser. TR-20. Pittsburgh, PA: Air & Waste Management Association: 565-579.
- Allen, Eric R.; Gholz, Henry L. 1995. Air quality and atmospheric deposition in southern U.S. forests. In: Fox, Susan A.; Mickler, Robert A., eds. *Impact of air pollutants on southern pine forests*. New York: Springer-Verlag: 83-170.
- Allen, Eric R.; Sutton, Robert L. 1991. Acidic deposition to north Florida forest ecosystems. In: Watkins, Curtis E., ed. *Proceedings of the Florida acidic deposition conference; 1990 October 22-24; Tampa, FL*. Tallahassee, FL: Florida Department of Environmental Regulation: 100-124.
- Allen, Eric R.; Sutton, Robert L.; Evans, Gary F. 1992. Air quality characterization and acid deposition monitoring at three southern commercial forest sites. In: Flagler, Richard B., ed. *The response of southern commercial forests to air pollution: transactions; 1991 November 4-7; Atlanta, GA*. A&WMA Transactions Ser. TR-21. Pittsburgh, PA: Air & Waste Management Association: 95-110.
- Allen, H.L.; Heck, W.W.; Kress, L.W. 1988. Response of loblolly pine families to acidic precipitation and ozone stress. In: Carey, Ann; Blair, Roger; Saint, Chris, eds. *Forest Response Program annual meeting: project status report; 1988 February 22-26; Corpus Christi, TX*. Raleigh, NC: North Carolina State University, Atmospheric Impacts Research Program: 60-64. Vol. 1.

-
- Allen, H. Lee; Kidd, T.J.; Kress, L.W. 1990. The influence of ozone on foliage accretion, senescence and quantity of young loblolly pine. *Bulletin of the Ecological Society of America*. 71(2, Supplement): 75. Abstract.
- Allen, H. Lee; Kidd, T.J.; Kress, L.W. 1990. The influence of ozone on foliage accretion, senescence and quantity of young loblolly pine (*Pinus taeda* L.). In: Bongarten, B.C.; Dougherty, P.M.; Teskey, R.O., comps. Program and abstracts from the 11th North American forest biology workshop; 1990 June 13-15; Athens, GA. Athens, GA: University of Georgia: 67. Abstract.
- Allen, H. Lee; Richardson, Curtis J.; Kress, Lance W. 1989. Impact of ozone on carbon acquisition and allocation in young loblolly pine. *Bulletin of the Ecological Society of America*. 70(2, Supplement): 49. Abstract.
- Allen, H. Lee; Stow, Tara K.; Chappelka, Arthur H.; Kress, Lance W.; Teskey, Robert O. 1992. Ozone impacts on foliage dynamics of loblolly pine. In: Flagler, Richard B., ed. The response of southern commercial forests to air pollution: transactions; 1991 November 4-7; Atlanta, GA. A&WMA Transactions Ser. TR-21. Pittsburgh, PA: Air & Waste Management Association: 149-162.
- Anderson, R.L.; Berrang, P.; Knighten, J.; Lawton, K.A. 1990. The effect of simulated acidic precipitation on the development of dogwood anthracnose symptoms. In: Bongarten, B.C.; Dougherty, P.M.; Teskey, R.O., comps. Program and abstracts from the 11th North American forest biology workshop; 1990 June 13-15; Athens, GA. Athens, GA: University of Georgia: 67. Abstract.
- Anderson, Robert L.; Berrang, Paul; Knighten, John; Lawton, K. Ann; Britton, Kerry O. 1993. Pretreating dogwood seedlings with simulated acidic precipitation increases dogwood anthracnose symptoms in greenhouse-laboratory trials. *Canadian Journal of Forest Research*. 23: 55-58.
- Arumugham, Thangam. 1992. Curvature and experimental design for the Weibull model. Raleigh, NC: North Carolina State University, Department of Statistics. 257 p. Ph.D. dissertation.
- Awuma, K.; Buttler, I.W.; Nkedi-Kizza, P.; Dowd, J. 1989. Calibration and error analysis of pressure transducer-equipped tensiometers. *Agronomy Abstracts*: 298. Abstract.
- Baker, Timothy R.; Allen, H. Lee; Kress, Lance W.; Schoeneberger, Michele M. 1991. Response of above-ground nutrients in loblolly pine to exposure with ozone and acid precipitation. *Bulletin of the Ecological Society of America*. 72(2, Supplement): 60. Abstract.
- Baker, Timothy R.; Allen, H. Lee; Schoeneberger, Michele M.; Kress, Lance W. 1994. Nutritional response of loblolly pine exposed to ozone and simulated acid rain. *Canadian Journal of Forest Research*. 24: 453-461.
- Baldocchi, Dennis D.; White, Randall; Johnston, J. William. 1989. A wind tunnel study to design large, open-top chambers for whole-tree pollutant exposure experiments. *JAPCA*. 39: 1549-1556.

-
- Bartuska, A.M. 1986. Acid deposition and forest decline: how do we identify cause and effect? In: Program of the 4th International Congress of Ecology, 71st annual meeting of the Ecological Society of America, and 5th meeting of the International Society of Ecological Modeling; 1986 August 10-16; Syracuse, NY. Syracuse, NY: State University of New York: 86. Abstract.
- Bartuska, Ann M. 1988. Air pollution and southern pines: status of the Southern Commercial Forest Research Cooperative. In: Southwide forest disease workshop: program and abstracts; 1988 June 7-9; Alexandria, LA. Alexandria, LA: U.S. Department of Agriculture, Forest Service, Forest Pest Management. Unpaged. Abstract.
- Bartuska, Ann M. 1986. Southern Commercial Forest Research Cooperative: program plan. Raleigh, NC: U.S. Department of Agriculture, Forest Service, Forest Response Program. Unpaged.
- Bartuska, Ann M. 1987. Southern Commercial Forest Research Cooperative: research plan. Raleigh, NC: U.S. Department of Agriculture, Forest Service, Forest Response Program; and U.S. Environmental Protection Agency. 131 p.
- Bartuska, Ann M. 1987. The Southern Commercial Forest Research Cooperative: status report. Raleigh, NC: U.S. Department of Agriculture, Forest Service, Southern Commercial Forest Research Cooperative. 17 p.
- Bartuska, Ann M.; Joyner, Kimberly C. 1985. Impact of atmospheric deposition on forested ecosystems. In: Proceedings of national conference on hazardous wastes and environmental emergencies; 1985 May 14-15; Cincinnati, OH. [Place of publication unknown]: [Publisher unknown]: 354-357.
- Bartuska, Ann M.; Joyner, Kimberly C. 1987. Status report on the Southern Commercial Forest Research Cooperative. In: 80th annual meeting of APCA; 1987 June 21-26; New York, NY. Paper No. 87-34.3. Pittsburgh, PA: Air Pollution Control Association: 15 p.
- Bartuska, Ann M.; Joyner, Kimberly C.; Mickler, Robert. 1988. Southern Commercial Forest Research Cooperative, Forest Response Program: program description. Raleigh, NC: U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station; and U.S. Environmental Protection Agency. 31 p.
- Bartuska, Ann M.; Joyner, Kimberly C.; Mickler, Robert. 1988. Southern Commercial Forest Research Cooperative, Forest Response Program: technical progress report. Raleigh, NC: U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station; and U.S. Environmental Protection Agency. 26 p.
- Bartuska, Ann M.; Medlarz, Susan A.; Joyner, Kimberly C. 1989. Southern Commercial Forest Research Cooperative: intensive research sites. Raleigh, NC: U.S. Department of Agriculture, Forest Service, Forest Response Program; and U.S. Environmental Protection Agency. 28 p.
- Bechtold, William A.; Ruark, Gregory A. 1988. Structure of pine stands in the Southeast. Res. Pap. SE-274. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station. 185 p.

-
- Berrang, Paul; Brown, Dan. 1988. Air Pollution Testing Center. In: Southwide forest disease workshop: program and abstracts; 1988 June 7-9; Alexandria, LA. Alexandria, LA: U.S. Department of Agriculture, Forest Service, Forest Pest Management. Unpaged. Abstract.
- Berrang, Paul; Meadows, James S.; Hodges, John D. 1995. An overview of responses of southern pines to airborne chemical stresses. In: Fox, Susan A.; Mickler, Robert A., eds. Impact of air pollutants on southern pine forests. New York: Springer-Verlag: 196-243.
- Berrang, Paul; Meadows, James S.; Hodges, John D. 1995. An overview of responses of southern pines to airborne chemical stresses. In: Fox, Susan A.; Mickler, Robert A., eds. Impact of air pollutants on southern pine forests. New York: Springer-Verlag: 196-243.
- Binkley, D.; Driscoll, C.T.; Allen, H.L.; Schoeneberger, P.; McAvoy, D. 1989. Acidic deposition and forest soils: context and case studies in the Southeastern United States. Ecological Studies Vol. 72. New York: Springer-Verlag. 149 p.
- Binkley, Dan. 1989. Sensitivity of forest soils in the western U.S. to acidic deposition. In: Olson, Richard K.; Lefohn, Allen S., eds. Proceedings, Effects of air pollution on western forests; 1989 June; Anaheim, CA. APCA Transactions Ser. TR-16. Pittsburgh, PA: Air & Waste Management Association: 561-573.
- Binkley, Dan; Driscoll, Charles T.; Allen, H. Lee; Schoeneberger, Philip; McAvoy, Drew. 1988. Impacts of acidic deposition: context and case studies of forest soils in the Southeastern U.S. In: Carey, Ann; Blair, Roger; Saint, Chris, eds. Forest Response Program annual meeting: project status report; 1988 February 22-26; Corpus Christi, TX. Raleigh, NC: North Carolina State University, Atmospheric Impacts Research Program: 104-107. Vol. 1.
- Binkley, Dan; Valentine, David; Wells, Carol; Valentine, Ute. 1989. An empirical analysis of the factors contributing to 20-year decrease in soil pH in an old-field plantation of loblolly pine. Biogeochemistry. 8: 39-54.
- Blake, John I.; Somers, Greg L.; Ruark, Gregory A. 1990. Perspectives on process modeling of forest growth responses to environmental stress. In: Dixon, Robert K.; Meldahl, Ralph S.; Ruark, Gregory A.; Warren, William G., eds. Process modeling of forest growth responses to environmental stress. Portland, OR: Timber Press: 9-17.
- Boutton, T.W.; Flagler, R.B. 1991. $^{13}\text{C}/^{12}\text{C}$ ratios as indicators of plant physiological response to ozone and simulated acid rain. In: Stable isotopes in plant nutrition, soil fertility and environmental studies: proceedings of an international symposium; 1990 October 1-5; Vienna. Vienna: International Atomic Energy Agency: 627-631.
- Boutton, Thomas W.; Flagler, Richard B. 1990. Growth and water-use efficiency of shortleaf pine as affected by ozone and acid rain. 83rd annual meeting and exhibition, Air & Waste Management Association; 1990 June 24-29; Pittsburgh, PA. Paper No. 90-187.7. Pittsburgh, PA: Air & Waste Management Association. 16 p.

-
- Brown, D.; Berrang, P. 1988. Development of an air pollution testing center. In: Carey, Ann; Blair, Roger; Saint, Chris, eds. Forest Response Program annual meeting: project status report; 1988 February 22-26; Corpus Christi, TX. Raleigh, NC: North Carolina State University, Atmospheric Impacts Research Program: 122-123. Vol. 1.
- Buttler, I.W.; Nkedi-Kizza, P.; Jessup, R.; Awuma, K. 1989. Measurement and prediction of water potential and fluxes in a flatwood forest soil profile. *Agronomy Abstracts*: 300. Abstract.
- Buttler, Imo; Riha, Susan J. 1987. General purpose simulation model of water flow in the soil-plant-atmosphere continuum. *Applied Agricultural Research*. 2(4): 230-234.
- Byres, David P.; Dean, Thomas J.; Johnson, Jon D. 1992. Long-term effects of ozone and simulated acid rain on the foliage dynamics of slash pine (*Pinus elliottii* var. *elliottii* Engelm.). *New Phytologist*. 120: 61-67.
- Byres, David P.; Johnson, Jon D.; Dean, Thomas J. 1992. Seasonal response of slash pine (*Pinus elliottii* var. *elliottii* Engelm.) photosynthesis to long-term exposure to ozone and acidic precipitation. *New Phytologist*. 122: 91-96.
- Carter, Gregory A.; Mitchell, Robert J.; Chappelka, Arthur H.; Brewer, Charles H. 1992. Response of leaf spectral reflectance in loblolly pine to increased atmospheric ozone and precipitation acidity. *Journal of Experimental Botany*. 43: 577-584.
- Cavender, K.A.; Allen, E.R. 1991. Vertical ozone profile measurements in a rural forest environment. In: Berglund, Ronald L.; Lawson, Douglas R.; McKee, David J., eds. Tropospheric ozone and the environment: transactions; 1990 March 20-22; Los Angeles, CA. A&WMA Transactions Ser. TR-19. Pittsburgh, PA: Air & Waste Management Association: 673-691.
- Cavender, Kevin A.; Allen, Eric R. 1988. Measurement of a vertical ozone concentration profile in a slash pine forest. Presented: 1988 meeting of the Florida section of the Air Pollution Control Association; 1988 September 26. Unpublished manuscript on file: Raleigh, NC: U.S. Department of Agriculture, Forest Service.
- Cavender, Kevin A.; Allen, Eric R. 1990. Vertical ozone profile measurements in a rural environment. 83rd annual meeting and exhibition of the Air & Waste Management Association; 1990 June 24-29; Pittsburgh, PA. Paper No. 90-95.5. Pittsburgh, PA: Air & Waste Management Association. 16 p.
- Chappelka, A.H. 1992. Air pollution effects on eastern hardwood forests in the U.S.A. In: Chiang, Chia-Hua; Wang, Ya-Nan, eds. Proceedings of the 1992 joint international symposium on air pollution, soil microbiology, and biotechnology of forestry; 1992 June 1-5; Taipei, Taiwan. Auburn, AL: Auburn University, School of Forestry: 23-31.
- Chappelka, A.H.; Lockaby, B.G.; Meldahl, R.S. 1988. Response of loblolly pine families to acidic precipitation and ozone in Alabama. In: Carey, Ann; Blair, Roger; Saint, Chris, eds. Forest Response Program annual meeting: project status report; 1988 February 22-26; Corpus Christi, TX. Raleigh, NC: North Carolina State University, Atmospheric Impacts Research Program: 102-103. Vol. 1.

-
- Chappelka, A.H.; Lockaby, B.G.; Meldahl, R.S.; Kush, J.S. 1988. An intensive field research site investigating the effects of atmospheric deposition on loblolly pine growth. In: Olem, Harvey, ed. Proceedings of the fifth annual Gatlinburg acid rain conference; 1988 October 31-November 1; Gatlinburg, TN. Chattanooga, TN: Tennessee Valley Authority: 25. Abstract.
- Chappelka, A.H.; Lockaby, B.G.; Meldahl, R.S.; Kush, J.S. 1989. Atmospheric deposition effects on loblolly pine: development of an intensive field research site. In: Miller, James H., comp. Proceedings of the fifth biennial southern silvicultural research conference; 1988 November 1-3; Memphis, TN. Gen. Tech. Rep. SO-74. New Orleans, LA: U.S. Department of Agriculture, Forest Service, Southern Forest Experiment Station: 57-60.
- Chappelka, A.H.; Lockaby, B.G.; Meldahl, R.S.; Kush, J.S. 1991. Response of field-grown loblolly pine to ozone and acidic precipitation. *Highlights of Agricultural Research (Alabama Agricultural Experiment Station)*. 38(1): 4.
- Chappelka, A.H.; Lockaby, B.G.; Meldahl, R.S.; Kush, J.S.; Chevone, B.I. 1989. Growth response of forest trees to acidic precipitation and ozone. In: Brasser, L.J.; Mulder, W.C., eds. *Man and his ecosystem: proceedings of the 8th world clean air congress*; 1989 September 11-15; Hague, The Netherlands. Amsterdam: Elsevier: 67-72. Vol. 2.
- Chappelka [Chappelka], A.H.; Lockaby, B.G.; Meldahl [Meldahl], R.S.; Kush, J.S.; Robins, E. 1989. Response of loblolly pine to acidic precipitation and ozone in Alabama. In: Noble, Reginald, D.; Martin, Juri L.; Jensen, Keith F., eds. *Air pollution effects on vegetation including forest ecosystems: proceedings of the 2nd US-USSR symposium*; 1988 September 13-25; Corvallis, OR, Raleigh, NC, Gatlinburg, TN. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station: 289. Abstract.
- Chappelka, Art H.; Kush, J.S.; Meldahl, R.S.; Lockaby, B.G. 1989. An ozone-low temperature interaction in loblolly pine. In: Weaver, Linda A., ed. *Proceedings, 6th annual Gatlinburg acid rain conference*; 1989 October 30-31; Gatlinburg, TN. Knoxville, TN: Tennessee Valley Authority: 37. Abstract.
- Chappelka, Arthur H. 1987. Air pollution: a threat to forests in the South? *Alabama Forests*. 31(6): 31-32.
- Chappelka, Arthur H.; Chevone, Boris I. 1992. Tree responses to ozone. In: Lefohn, Allen S., ed. *Surface level ozone exposures and their effects on vegetation*. Chelsea, MI: Lewis Publishers: 271-324.
- Chappelka, Arthur H.; Flagler, Richard B. 1991. Future directions in ozone forestry research. In: Berglund, Ronald L.; Lawson, Douglas R.; McKee, David J., eds. *Tropospheric ozone and the environment: transactions*; 1990 March 20-22; Los Angeles, CA. A&WMA Transactions Ser. TR-19. Pittsburgh, PA: Air & Waste Management Association: 321-338.

- Chappelka, Arthur H.; Hildebrand, Elisabeth; Skelly, John M.; Mangis, Deborah; Renfro, James R. 1992. Effects of ambient ozone concentrations on mature eastern hardwood trees growing in Great Smoky Mountains National Park and Shenandoah National Park. 85th annual meeting and exhibition, Air & Waste Management Association; 1992 June 21-26; Kansas City, MO. Paper No. 92-150.04. Pittsburgh, PA: Air & Waste Management Association. 12 p.
- Chappelka, Arthur H.; Kush, John S.; Meldahl, Ralph S.; Lockaby, B. Graeme. 1990. An ozone-low temperature interaction in loblolly pine (*Pinus taeda* L.). New Phytologist. 114: 721-726.
- Chappelka, Arthur H.; Lockaby, B. Graeme; Meldahl, Ralph S.; Allen, H. Lee; Kress, Lance W. 1992. Effects of ozone and acidic precipitation after three years on growth of loblolly pine saplings in the piedmont of North Carolina and coastal plain of Alabama. In: Flagler, Richard B., ed. The response of southern commercial forests to air pollution: transactions; 1991 November 4-7; Atlanta, GA. A&WMA Transactions Ser. TR-21. Pittsburgh, PA: Air & Waste Management Association: 163-172.
- Chappelka, Arthur H.; Lockaby, B. Graeme; Mitchell, Robert J.; Meldahl, Ralph S.; Kush, John S.; Jordan, Dean N. 1990. Growth and physiological responses of loblolly pine exposed to ozone and simulated acidic rain in the field. 83rd annual meeting and exhibition, Air & Waste Management Association; 1990 June 24-29; Pittsburgh, PA. Paper No. 90-187.5. Pittsburgh, PA: Air & Waste Management Association. 16 p.
- Christensen, N.L.; Peet, R.K. 1988. Analysis of Duke Forest permanent plots: patterns of production and mortality of seedlings and trees. In: Carey, Ann; Blair, Roger; Saint, Chris, eds. Forest Response Program annual meeting: project status report; 1988 February 22-26; Corpus Christi, TX. Raleigh, NC: North Carolina State University, Atmospheric Impacts Research Program: 85-89. Vol. 1.
- Christensen, Norman L.; Peet, Robert K. 1988. Patterns of growth and mortality of loblolly pine (*Pinus taeda*) in permanent sample plots of the Duke Forest 1934-1988. Report submitted to Dr. Ann Bartuska, program manager, Southern Commercial Forest Research Cooperative. 15 p. Draft manuscript on file: Raleigh, NC: U.S. Department of Agriculture, Forest Service.
- Cleveland, Glenn D.; Haines, L. Wayne; Jahromi, Siroos T.; Bryant, Richard L. 1992. No evidence of growth decline in International Paper's southern commercial loblolly and slash pine forests. In: Flagler, Richard B., ed. The response of southern commercial forests to air pollution: transactions; 1991 November 4-7; Atlanta, GA. A&WMA Transactions Ser. TR-21. Pittsburgh, PA: Air & Waste Management Association: 37-47.
- Cline, Michael L. 1988. Influence of atmospherically deposited nitrogen on mycorrhizae: a critical literature review. In: Carey, Ann; Blair, Roger; Saint, Chris, eds. Forest Response Program annual meeting: project status report; 1988 February 22-26; Corpus Christi, TX. Raleigh, NC: North Carolina State University, Atmospheric Impacts Research Program: 79-84. Vol. 1.
- Cline, Michael L.; Marx, Donald H. 1995. Atmospheric nitrogen deposition and the mycorrhizae of southern commercial forest trees. In: Fox, Susan A.; Mickler, Robert A., eds. Impact of air pollutants on southern pine forests. New York: Springer-Verlag: 337-387.

-
- Cline, Michael L.; Stephans, Rebecca J.; Marx, Donald H. 1988. Influence of atmospherically deposited nitrogen on mycorrhizae in the southeastern commercial forest: a critical literature review. Final report submitted to U.S. Department of Agriculture, Forest Service, Southern Commercial Forest Research Cooperative. Various pagings. Report on file: Raleigh, NC: U.S. Department of Agriculture, Forest Service.
- Cregg, B.M.; Dougherty, P.M.; Teskey, R.O. 1990. Carbon allocation of loblolly pine branches in relation to water and shade stress. In: Bongarten, B.C.; Dougherty, P.M.; Teskey, R.O., comps. Program and abstracts from the 11th North American forest biology workshop; 1990 June 13-15; Athens, GA. Athens, GA: University of Georgia: 40-41. Abstract.
- Cregg, B.M.; Dougherty, P.M.; Teskey, R.O. 1990. Net photosynthetic response of loblolly pine branches grown under three shade conditions. In: Bongarten, B.C.; Dougherty, P.M.; Teskey, R.O., comps. Program and abstracts from the 11th North American forest biology workshop; 1990 June 13-15; Athens, GA. Athens, GA: University of Georgia: 73-74. Abstract.
- Cregg, B.M.; Halpin, J.E.; Dougherty, P.M.; Teskey, R.O. 1989. Comparative physiology and morphology of seedling and mature forest trees. In: Noble, Reginald D.; Martin, Juri L.; Jensen, Keith F., eds. Air pollution effects on vegetation including forest ecosystems: proceedings of the 2nd US-USSR symposium; 1988 September 13-25; Corvallis, OR, Raleigh, NC, Gatlinburg, TN. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station: 111-118.
- Cregg, Bert M.; Hennessey, Thomas C.; Dougherty, Phillip M. 1990. Water relations of loblolly pine trees in southeastern Oklahoma following precommercial thinning. *Canadian Journal of Forest Research*. 20: 1508-1513.
- Cregg, Bert M.; Teskey, Robert O.; Dougherty, Phillip M. 1993. Effect of shade stress on growth, morphology, and carbon dynamics of loblolly pine branches. *Trees: Structure and Function*. 7: 208-213.
- Dean, Thomas J.; Johnson, Jon D. 1992. Acid rain and ozone effects of root-length density of *Pinus elliottii* grown in open-top chambers. *Bulletin of the Ecological Society of America*. 73(2, Supplement): 156. Abstract.
- Dean, Thomas J.; Johnson, Jon D. 1992. Growth response of young slash pine trees to simulated acid rain and ozone stress. *Canadian Journal of Forest Research*. 22: 839-848
- Dean, Thomas J.; Johnson, Jon D. 1989. Ozone effects on water-supplying capacity to the crowns of one-year-slash pine seedlings. Presented: International workshop, dynamics of ecophysiological processes in tree crowns and forest canopies; 1989 September 24-29; Rhinelander, WI. [Publication information unknown]. Abstract. Abstract on file: Raleigh, NC: U.S. Department of Agriculture, Forest Service.

- Dean, Thomas J.; Johnson, Jon D. 1991. Proportional-plus-integral control of experimental ozone concentrations in a large open-top chamber. *Atmospheric Environment*. 25A(5-6): 1123-1126.
- Dean, Thomas J.; Johnson, Jon D. 1989. Rapid response of *Pinus elliottii* to simulated acid rain and elevated ozone concentrations. *Bulletin of the Ecological Society of America*. 70(2, Supplement): 95. Abstract.
- Dean, Thomas J.; Johnson, Jon D. 1990. Seasonal root growth of slash pine (*Pinus elliottii* englem. var. *elliottii*) seedlings exposed to acidic precipitation and ozone stress. In: Bongarten, B.C.; Dougherty, P.M.; Teskey, R.O., comps. Program and abstracts from the 11th North American forest biology workshop; 1990 June 13-15; Athens, GA. Athens, GA: University of Georgia: 8-9. Abstract.
- Dixon, Robert K.; Meldahl, Ralph S.; Ruark, Gregory A.; Warren, William G., eds. 1990. Process modeling of forest growth responses to environmental stress. Portland, OR: Timber Press. 441 p.
- Dizengremel, P.; Sasek, T.W.; Brown, K.J.; Richardson, C.J. 1994. Ozone-induced changes in primary carbon metabolism enzymes of loblolly pine needles. *Journal of Plant Physiology*. 144: 300-306.
- Dougherty, Phillip M. 1995. Response of loblolly pine to moisture and nutrient stress. In: Fox, Susan A.; Mickler, Robert A., eds. Impact of air pollutants on southern pine forests. New York: Springer-Verlag: 173-195.
- Dougherty, Phillip M.; Teskey, Robert O.; Jarvis, Paul G. 1992. Development of MAESTRO, a process based model for assessing the impact of ozone on net carbon exchange of loblolly pine trees. In: Flagler, Richard B., ed. The response of southern commercial forests to air pollution: transactions; 1991 November 4-7; Atlanta, GA. A&WMA Transactions Ser. TR-21. Pittsburgh, PA: Air & Waste Management Association: 303-312.
- Eissenstat, D.M.; Syvertsen, J.P.; Dean, T.J.; Yelenosky, G.; Johnson, J.D. 1991. Sensitivity of frost resistance and growth in citrus and avocado to chronic ozone exposure. *New Phytologist*. 118: 139-146.
- Eissenstat, David M.; Syvertsen, James P.; Dean, Thomas J.; Johnson, Jon D.; Yelenosky, George. 1991. Interaction of simulated acid rain with ozone on freeze resistance, growth, and mineral nutrition in citrus and avocado. *Journal of the American Society for Horticultural Science*. 116(5): 838-845.
- Elsik, Christine G.; Flagler, Richard B.; Boutton, Thomas W. 1993. Carbon isotope composition and gas exchange of loblolly and shortleaf pine as affected by ozone and water stress. In: Ehleringer, James R.; Hall, Anthony E.; Farquhar, Graham D.; Ting, I.P., eds. Stable isotopes and plant carbon-water relations. New York: Academic Press: 227-244.
- Elsik, Christine G.; Flagler, Richard B.; Boutton, Thomas W. 1992. Effects of ozone and water deficit on growth and physiology of *Pinus taeda* and *Pinus echinata*. In: Flagler, Richard B., ed. The response of southern commercial forests to air pollution: transactions; 1991 November 4-7; Atlanta, GA. A&WMA Transactions Ser. TR-21. Pittsburgh, PA: Air & Waste Management Association: 225-245.

-
- Fangmeier, A.; Kress, L.W.; Lepper, P.; Heck, W.W. 1990. Ozone effects on the fatty acid composition of loblolly pine needles (*Pinus taeda* L.). *New Phytologist*. 115: 639-647.
- Faulkner, Patricia; Schoeneberger, Michele M.; Kress, Lance W. 1991. Belowground changes in loblolly pine as indicators of ozone stress. In: Coleman, Sandra S.; Neary, Daniel G., comps. and eds. In: *Proceedings of the 6th biennial southern silvicultural research conference*; 1990 October 30-November 1; Memphis, TN. Gen. Tech. Rep. SE-70. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station: 332-341.
- Flagler, R.; Toups, B.; Lock, J.E. 1989. Response of shortleaf pine to acid rain and ozone. In: NADP technical committee meeting abstracts of papers; 1989 October 23-26; Provincetown, MA. Fort Collins, CO: National Atmospheric Deposition Program: 5. Abstract.
- Flagler, R.B.; Lock, J.E.; Toups, B.G. 1992. Growth and gas exchange characteristics of shortleaf pine exposed to ozone and acid rain. In: *Health and ecological effects: papers from the 9th world clean air congress*; 1992 August 30-September 4.; Montreal, Quebec, Canada. Paper No. IU-22A.06. Pittsburgh, PA: Air & Waste Management Association. Vol. 5.
- Flagler, R.B.; Lock, J.E.; Toups, B.G. 1990. Ozone and simulated acidic rain effects on shortleaf pine seedlings. In: *Are forests the answer? Proceedings of the 1990 Society of American Foresters national convention*; 1990 July 29-August 1; Washington, DC. Bethesda, MD: Society of American Foresters: 577-578.
- Flagler, R.B.; Toups, B.G. 1991. Growth decreases in shortleaf pine as a result of exposure to ambient ozone. In: *Pacific rim forestry - bridging the world: Proceedings of the 1991 Society of American Foresters national convention*; 1991 August 4-7; San Francisco, CA. SAF Publication No. 91-05. Bethesda, MD: Society of American Foresters: 570-571.
- Flagler, R.B.; Toups, B.G. 1992. Use of sodium erythorbate to determine the effects of ambient ozone on shortleaf pine. In: Flagler, Richard B., ed. *The response of southern commercial forests to air pollution: transactions*; 1991 November 4-7; Atlanta, GA. A&WMA Transactions Ser. TR-21. Pittsburgh, PA: Air & Waste Management Association: 325-326. Abstract.
- Flagler, R.B.; Toups, B.G.; Lock, J.E. 1990. Growth and physiology of shortleaf pine as affected by acidic rain and ozone. In: *Conference abstracts, international conference on acidic deposition: its nature and effects*; 1990 September 16-21; Glasgow, Scotland. Glasgow: Royal Society of Edinburgh: 432. Abstract.
- Flagler, Richard B. 1988. Response of shortleaf pine families to acidic precipitation and ozone in East Texas. In: Carey, Ann; Blair, Roger; Saint, Chris, eds. *Forest Response Program annual meeting: project status report*; 1988 February 22-26; Corpus Christi, TX. Raleigh, NC: North Carolina State University, Atmospheric Impacts Research Program: 99-101. Vol. 1.

-
- Flagler, Richard B., ed. 1992. The response of southern commercial forests to air pollution: transactions; 1991 November 4-7; Atlanta, GA. A&WMA Transactions Ser. TR-21. Pittsburgh, PA: Air & Waste Management Association. 333 p.
- Flagler, Richard B.; Barrows, Cathleen F.; Chappelka, Arthur H.; Johnson, Jon D.; Kress, Lance W.; Reardon, John C.; Fox, Susan. [Accepted]. Combined analyses of three southern pine species exposed to ozone and acidic rain. *Journal of Environmental Quality*.
- Flagler, Richard B.; Boutton, Thomas W. 1991. Growth and physiological response of *Pinus echinata* exposed to ozone and acid rain. *Bulletin of the Ecological Society of America*. 72(2, Supplement): 114. Abstract.
- Flagler, Richard B.; Chappelka, Arthur H. 1995. Growth response of southern pines to acidic precipitation and ozone. In: Fox, Susan A.; Mickler, Robert A., eds. *Impact of air pollutants on southern pine forests*. New York: Springer-Verlag: 388-424.
- Flagler, Richard B.; Lock, John E.; Elsik, Christine G. 1994. Leaf-level and whole-plant gas exchange characteristics of shortleaf pine exposed to ozone and simulated acid rain. *Tree Physiology*. 14: 361-374.
- Flagler, Richard B.; McKinley, Craig R. 1992. Response of two loblolly pine ecotypes to ozone. *Bulletin of the Ecological Society of America*. 73(2, Supplement): 175. Abstract.
- Flagler, Richard B.; Spruill, Susan E. 1990. Regional response of southern pines to acid rain and ozone. In: Bongarten, B.C.; Dougherty, P.M.; Teskey, R.O., comps. *Program and abstracts from the 11th North American forest biology workshop; 1990 June 13-15; Athens, GA*. Athens, GA: University of Georgia: 75-76.
- Flagler, Richard B.; Spruill, Susan E.; Chappelka, Arthur H.; Dean, Thomas J.; Kress, Lance W.; Reardon, John C. 1992. Growth of three southern pine species as affected by acid rain and ozone: a combined analysis. In: Flagler, Richard B., ed. *The response of southern commercial forests to air pollution: transactions; 1991 November 4-7; Atlanta, GA*. A&WMA Transactions Ser. TR-21. Pittsburgh, PA: Air & Waste Management Association: 207-224.
- Fong, Franklin; Wiselogle, Art; Bailey, James; Newton, Ron. 1988. Growth responses of loblolly pine (*Pinus taeda* L.) to ozone under optimum and low-water conditions. In: Carey, Ann; Blair, Roger; Saint, Chris, eds. *Forest Response Program annual meeting: project status report; 1988 February 22-26; Corpus Christi, TX*. Raleigh, NC: North Carolina State University, Atmospheric Impacts Research Program: 37-42. Vol. 1.
- Fox, Douglas G.; Bartuska, Ann M.; Byrne, James G.; Cowling, Ellis; Fisher, Richard; Likens, Gene E.; Lindberg, Steven E.; Linthurst, Rick A.; Messer, Jay; Nichols, Dale S. 1989. A screening procedure to evaluate air pollution effects on Class 1 wilderness areas. Gen. Tech. Rep. RM-168. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 36 p.

-
- Fox, Susan A. 1995. Introduction: The Southern Commercial Forest Research Cooperative. In: Fox, Susan A.; Mickler, Robert A., eds. Impact of air pollutants on southern pine forests. New York: Springer-Verlag: 1-15.
- Fox, Susan; Joyner, Kimberly C.; Bartuska, Ann M. 1992. Overview of the Southern Commercial Forest Research Cooperative. In: Flagler, Richard B., ed. The response of southern commercial forests to air pollution: transactions; 1991 November 4-7; Atlanta, GA. A&WMA Transactions Ser. TR-21. Pittsburgh, PA: Air & Waste Management Association: 1-16.
- Fox, Susan A.; Mickler, Robert A., eds. 1995. Impact of air pollutants on southern pine forests. New York: Springer-Verlag.
- Garner, J.H.B.; Pagano, T.; Joyner, K.; Cowling, E.B. 1988. Critical assessment of the probable role of acid deposition and other airborne sulfur- and nitrogen-derived pollutants in the forests of eastern North America. In: Carey, Ann; Blair, Roger; Saint, Chris, eds. Forest Response Program annual meeting: project status report; 1988 February 22-26; Corpus Christi, TX. Raleigh, NC: North Carolina State University, Atmospheric Impacts Research Program: 32-36. Vol. 1.
- Garner, J.H.B.; Pagano, Terry; Cowling, Ellis B. 1989. An evaluation of the role of ozone, acid deposition, and other airborne pollutants in the forests of eastern North America. Gen. Tech. Rep. SE-59. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station. 172 p.
- Garner, J.H.B.; Pagano, Terry; Cowling, Ellis B. 1989. Critical assessment of the role of acid deposition, photochemical oxidants, and other airborne sulfur- and nitrogen-derived pollutants in the forests of eastern North America. Final report to the Southern Commercial Forest Research Cooperative, Raleigh, NC. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station. Various pagings.
- Garrett-Kraus, Thomas A.; Meadows, James S.; Hodges, John D. 1987. STRESLIT: a program of environmental stress and stress response. Inf. Bull. 112. Mississippi State, MS: Mississippi Agricultural and Forestry Experiment Station, Department of Forestry. 11 p. [Computer program]
- Gaston, L.; Nkedi-Kizza, P.; Sawka, G.; Rao, P.S.C. 1990. Spatial variability of morphological properties at a Florida flatwoods site. Soil Science Society of America Journal. 54: 527-533.
- Gholz, Henry L.; Nkedi-Kizza, Peter; Allen, Eric; Lundgren, Dale. 1988. An integrated forest study for the Southern Commercial Forest Research Cooperative (SCFRC) in cooperation with the Electric Power Research Institute (EPRI). In: Carey, Ann; Blair, Roger; Saint, Chris, eds. Forest Response Program annual meeting: project status report; 1988 February 22-26; Corpus Christi, TX. Raleigh, NC: North Carolina State University, Atmospheric Impacts Research Program: 108-113. Vol. 1.
- Golemboski, Christine G.; Boutton, Thomas W.; Flagler, Richard B. 1991. Effects of ozone and water deficit on growth and physiology of *Pinus taeda* L. Bulletin of the Ecological Society of America. 72(2, Supplement): 125-126. Abstract.

- Green, T.H.; Jordan, D.N.; Chappelka, A.H.; Lockaby, B.G.; Meldahl, R.S.; Gjerstad, D.H. 1990. Response of total tannins and phenolics in loblolly pine (*Pinus taeda*) foliage exposed to ozone and acid rain. In: Bongarten, B.C.; Dougherty, P.M.; Teskey, R.O., comps. Program and abstracts from the 11th North American forest biology workshop; 1990 June 13-15; Athens, GA. Athens, GA: University of Georgia: 78-79. Abstract.
- Hanson, Paul J.; McLaughlin, Samuel B.; Edwards, Nelson T. 1988. Net CO₂ exchange of *Pinus taeda* shoots exposed to variable ozone levels and rain chemistries in field and laboratory settings. *Physiologia Plantarum*. 74: 635-642.
- Heagle, Allen S.; Philbeck, Robert B.; Ferrell, Ronald E.; Heck, Walter W. 1989. Design and performance of a large field exposure chamber to measure effects of air quality on plants. *Journal of Environmental Quality*. 18(3): 361-368.
- Hennessey, T.C.; Dougherty, P.M.; Cregg, B.M.; Wittwer, R.F. 1992. Annual variation in needle fall of a loblolly pine stand in relation to climate and stand density. *Forest Ecology and Management*. 51: 329-338.
- Hertel, G.D.; Adams, M. Beth; Andrus, Sheila; Barnard, J.E.; Brandt, C.J.; Eagar, C.; Kiester, A.R.; Martin, B.E.; Medlarz, Susan A.; McFadden, M.W.; Palmer, C.; Peterson, C.E. 1990. The effects of acid deposition and ozone on forest tree species: results of the Forest Response Program. 83rd annual meeting and exhibition, Air & Waste Management Association; 1990 June 24-29; Pittsburgh, PA. Paper No. 90-187.1. Pittsburgh, PA: Air & Waste Management Association. 27 p.
- Hertel, G.D.; Eagar, C.; Medlarz, S.A.; McFadden, M.W. 1993. The effects of acidic deposition and ozone on forest tree species in the eastern United States: results from the Forest Response Program. In: Huettl, R.F.; Mueller-Dombois, D., eds. *Forest decline in the Atlantic and Pacific region*. Berlin: Springer-Verlag: 54-65.
- Hodges, John D. 1988. Critical review of effects of natural and airborne chemical stresses on growth and development of individual trees and forests. In: Carey, Ann; Blair, Roger; Saint, Chris, eds. *Forest Response Program annual meeting: project status report; 1988 February 22-26; Corpus Christi, TX*. Raleigh, NC: North Carolina State University, Atmospheric Impacts Research Program: 43-47. Vol. 1.
- Horton, S.J.; Reinert, R.A.; Heck, W.W. 1990. Effects of ozone on three open-pollinated families of *Pinus taeda* L. grown in two substrates. *Environmental Pollution*. 65: 279-292.
- Horton, S.J.; Reinert, R.A.; Shafer, S.R.; Schoeneberger, M.M.; Wells, C.G. 1987. Comparative responses of loblolly pine half-sibling families to ozone and simulated acid rain. In: Wood, J.D., ed. *Abstracts of the 13th annual scientific research meeting; 1987 May 21-22; Great Smoky Mountains National Park*. Muscle Shoals, AL: Tennessee Valley Authority: 28. Abstract.
- Horton, S.J.; Schoeneberger, M.M.; Reinert, R.A.; Shafer, S.R.; Allen, H.L. 1989. Growth, carbohydrate reserves and nutrient content of loblolly pine seedlings exposed to ozone and simulated acidic rain. *Agronomy Abstracts*: 305. Abstract.

-
- Horton, Stephanie Jane. 1988. Effects of O₃ on open-pollinated loblolly pine families when grown in different substrates or supplied with different nitrogen fertilization levels. Raleigh, NC: North Carolina State University, Department of Botany. 87 p. M.S. thesis.
- Jarvis, P.G.; Barton, C.V.M.; Dougherty, P.M.; Teskey, R.O.; Massheder, J.M. 1991. MAESTRO. In: Irving, Patricia M., ed. Acidic deposition: state of science and technology: terrestrial, materials, health and visibility effects. Washington, DC: National Acid Precipitation Assessment Program: 17-167 - 17-178. Vol. 3.
- Johnson, Chiquita. 1989. Environmental studies facility completed. *Georgia Forestry*. 42(1): 4-5.
- Johnson, J.D.; Dean, T.J.; Arvanitis, L.G.; Graetz, D. 1988. Response of slash pine families to acidic precipitation and ozone in north Florida. In: Carey, Ann; Blair, Roger; Saint, Chris, eds. Forest Response Program annual meeting: project status report; 1988 February 22-26; Corpus Christi, TX. Raleigh, NC: North Carolina State University, Atmospheric Impacts Research Program: 95-98. Vol. 1.
- Johnson, J.D.; Michelozzi, M.; Byres, D.; Osmond, J. 1992. The effect of ozone on the induced host resistance of slash pine. In: Flagler, Richard B., ed. The response of southern commercial forests to air pollution: transactions; 1991 November 4-7; Atlanta, GA. A&WMA Transactions Ser. TR-21. Pittsburgh, PA: Air & Waste Management Association: 323. Abstract.
- Johnson, Jon D.; Byres, David; Chappelka, Arthur H.; Dean, Thomas J. 1992. The role of homeostatic growth in the response of slash and loblolly pine to ozone and acid rain. In: Flagler, Richard B., ed. The response of southern commercial forests to air pollution: transactions; 1991 November 4-7; Atlanta, GA. A&WMA Transactions Ser. TR-21. Pittsburgh, PA: Air & Waste Management Association: 273-286.
- Johnson, Jon D.; Chappelka, Arthur H.; Hain, Fred P.; Heagle, Allen S. 1995. Interactive effects of air pollutants with abiotic and biotic factors on southern pine forests. In: Fox, Susan A.; Mickler, Robert A., eds. Impact of air pollutants on southern pine forests. New York: Springer-Verlag: 281-312.
- Jordan, D.N.; Green, T.H.; Chappelka, A.H.; Lockaby, B.G.; Meldahl, R.S.; Gjerstad, D.H. 1991. Response of total tannins and phenolics in loblolly pine foliage exposed to ozone and acid rain. *Journal of Chemical Ecology*. 17(3): 505-513.
- Jorgensen, Jacques R.; Heck, Walter W.; Allen, H. Lee; Heagle, Allen S.; Bruck, Robert I.; Schoeneberger, Michele M. 1987. Response of loblolly pine families to acidic precipitation and ozone stress. In: Terrestrial effects task group (5) peer review summaries, session C; 1987 March 8-13; Atlanta, GA. Washington, DC: National Acid Precipitation Assessment Program: 26-32.
- Kardono; Allen, Eric R. 1990. Radiatively important trace gas emissions in a forest environment. Presented: Annual meeting, Florida section, Air & Waste Management Association; 1990 September 23-25; Daytona Beach, FL. 12 p. Manuscript on file: Raleigh, NC: U.S. Department of Agriculture, Forest Service.

-
- Khorram, Siamak; Roten, Ray; Mills, Bob; Lucas, Marcie. 1988. Second annual report for the database entry and management system for the Southern Commercial Forest Research Cooperative. Raleigh, NC: North Carolina State University, Computer Graphics Center. 21 p.
- Khorram, Siamak; Roten, Ray; Mills, Bob; Lucas, Marcie; Conyers, Wayne; Khalesehdehghan, Hamid. 1990. Final report on the database entry and management system for the Southern Commercial Forest Research Cooperative. Raleigh, NC: North Carolina State University, Computer Graphics Center. 325 p.
- Knox, Robert G.; Peet, Robert K.; Christensen, Norman L. 1989. Population dynamics in loblolly pine stands: changes in skewness and size inequality. *Ecology*. 70(4): 1153-1166.
- Kossuth, S.V. 1988. Use of clonal trees for acid deposition studies. In: Carey, Ann; Blair, Roger; Saint, Chris, eds. Forest Response Program annual meeting: project status report; 1988 February 22-26; Corpus Christi, TX. Raleigh, NC: North Carolina State University, Atmospheric Impacts Research Program: 90-92. Vol. 1.
- Kossuth, Susan V.; Biggs, R. Hilton. 1989. Response of seedlings and mature trees of the same genotype to ozone. In: Noble, Reginald D.; Martin, Juri L.; Jensen, Keith F., eds. Air pollution effects on vegetation including forest ecosystems: proceedings of the 2nd US-USSR symposium; 1988 September 13-25; Corvallis, OR, Raleigh, NC, Gatlinburg, TN. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station: 287. Abstract.
- Kress, L.W.; Allen, H.L.; Mudano, J.E.; Heck, W.W. 1988. Response of loblolly pine to acidic precipitation and ozone. 81st annual meeting of the Air Pollution Control Association; 1988 June 19-24; Dallas, TX. Paper No. 88-70.5. Pittsburgh, PA: Air Pollution Control Association. 11 p.
- Kress, L.W.; Allen, H. Lee. 1991. Impact of ozone and acidic precipitation on the growth of loblolly pine seedlings. 84th annual meeting and exhibition, Air & Waste Management Association; 1991 June 16-21; Vancouver, B.C. Paper No. 91-142.9. Pittsburgh, PA: Air & Waste Management Association. 10 p.
- Kress, Lance W.; Albaugh, Timothy J. 1992. Effects of charcoal filtration and/or ozone enrichment on the concentration of CO₂ and NO_x in open-top chambers. In: Flagler, Richard B., ed. The response of southern commercial forests to air pollution: transactions; 1991 November 4-7; Atlanta, GA. A&WMA Transactions Ser. TR-21. Pittsburgh, PA: Air & Waste Management Association: 123-134.
- Kress, Lance W.; Allen, H. Lee; Mudano, Jane E.; Heck, Walter W. 1989. Ozone effects on the growth of loblolly pine. In: Bucher, J.B.; Bucher-Wallin, I., eds. Air pollution and forest decline: proceedings of the 14th international meeting for specialists in air pollution effects on forest ecosystems, IUFRO Project Group P2.05; 1988 October 2-8; Interlaken, Switzerland. Birmensdorf, Switzerland: Eidgenossische Anstalt fur das forstliche Versuchswesen: 153-158. Vol. 1.
- Kress, Lance W.; Allen, H. Lee; Mudano, Jane E.; Stow, Tara K. 1992. Impact of ozone on loblolly pine seedling foliage production and retention. *Environmental Toxicology and Chemistry*. 11: 1115-1128.

-
- Lefohn, Allen S.; Knudsen, H. Peter; Shadwick, Douglas S.; Hermann, Karl A. 1992. Surface ozone exposures in the eastern United States (1985-1989). In: Flagler, Richard B., ed. The response of southern commercial forests to air pollution: transactions; 1991 November 4-7; Atlanta, GA. A&WMA Transactions Ser. TR-21. Pittsburgh, PA: Air & Waste Management Association: 81-93.
- Lefohn, Allen S.; Shadwick, Douglas S.; Somerville, Matthew C.; Chappelka, Arthur H.; Lockaby, B. Graeme; Meldahl, Ralph S. 1992. The characterization and comparison of ozone exposure indices used in assessing the response of loblolly pine to ozone. *Atmospheric Environment*. 26A(2): 287-298.
- Lock, John E.; Flagler, Richard B.; Toups, Bradley G. 1990. Comparison of gas exchange rates for attached and detached needle fascicles of shortleaf pine seedlings. In: Bongarten, B.C.; Dougherty, P.M.; Teskey, R.O., comps. Program and abstracts from the 11th North American forest biology workshop; 1990 June 13-15; Athens, GA. Athens, GA: University of Georgia: 83. Abstract.
- Lucier, Alan A.; Barnard, Joseph E. 1992. Integration of epidemiological and mechanistic studies of southern pine health and air quality effects. In: Flagler, Richard B., ed. The response of southern commercial forests to air pollution: transactions; 1991 November 4-7; Atlanta, GA. A&WMA Transactions Ser. TR-21. Pittsburgh, PA: Air & Waste Management Association: 49-79.
- Ludovici, K.H.; Horton, S.; Reinert, R. 1991. Mode of application of simulated rain impacts soil and seedling growth. *Agronomy Abstracts*: 352. Abstract.
- Ludovici, K.H.; Lawton, K.A. 1991. Assessment of precipitation impacts on soil chemistry. *Agronomy Abstracts*: 352. Abstract.
- Ludovici, K.H.; Schoeneberger, M.M.; Reinert, R.A.; Davey, C.B. 1989. Changes in root biomass and mycorrhizal infection of loblolly pine seedlings exposed to different simulated rain chemistries. *Agronomy Abstracts*: 307-308. Abstract.
- Ludovici, Kim Haley. 1990. Influence of different simulated rain chemistries on a hapludult and the root growth of *Pinus taeda* L. Raleigh, NC: North Carolina State University, Department of Soil Science. 142 p. M.S. thesis.
- Luoma, Jon R.; Joyner, Kimberly C. 1990. Air pollution and forest decline: is there a link? *Agric. Inf. Bull.* 595. Washington, DC: U.S. Department of Agriculture, Forest Service. 13 p.
- Luxmoore, Robert J. 1992. An approach to scaling up physiological responses of forests to air pollutants. In: Flagler, Richard B., ed. The response of southern commercial forests to air pollution: transactions; 1991 November 4-7; Atlanta, GA. A&WMA Transactions Ser. TR-21. Pittsburgh, PA: Air & Waste Management Association: 313-322.
- Maier, Chris A.; Berrang, Paul; Lawton, K. Ann. 1990. The effects of simulated acid rain on the gas exchange and water relations of loblolly pine (*Pinus taeda* L.) growing in three forest soils. In: Bongarten, B.C.; Dougherty, P.M.; Teskey, R.O., comps. Program and abstracts from the 11th North American forest biology workshop; 1990 June 13-15; Athens, GA. Athens, GA: University of Georgia: 85. Abstract.

-
- Manderscheid, R.; Jager, H.J.; Kress, L.W. 1992. Effects of ozone on foliar nitrogen metabolism of *Pinus taeda* L. and implications for carbohydrate metabolism. *New Phytologist*. 121: 623-633.
- Manderscheid, R.; Jager, H.J.; Schoeneberger, M.M. 1991. Dose-response relationships of ozone effects on foliar levels of antioxidants, soluble polyamines and peroxidase activity of *Pinus taeda* (L): assessment of the usefulness as early ozone indicators. *Angewandte Botanik*. 65(5-6): 373-386.
- Marx, Donald H. 1986. The Southern Commercial Forest Research Cooperative. In: Atmospheric deposition and forest productivity: Proceedings of the 4th regional technical conference at the 65th annual meeting of the Appalachian Society of American Foresters; 1986 January 29-31; Raleigh, NC. SAF 86-06. Blacksburg, VA: Society of American Foresters: 98-110.
- Marx, Donald H.; Cowling, Ellis B.; Woodman, James N. 1985. Effects of air-borne chemicals on southern commercial forests: a scientific research plan and budget for the Southern Commercial Forest Research Cooperative. Sponsored by the U.S. Environmental Protection Agency; U.S. Department of Agriculture, Forest Service; National Council of the Pulp and Paper Industry for Air and Stream Improvement; and National Acid Precipitation Assessment Program Task Group F: Terrestrial Effects. Various pagings. Report on file: Raleigh, NC: U.S. Department of Agriculture, Forest Service.
- Marx, Donald H.; Shafer, Steven R. 1989. Fungal and bacterial symbioses as potential biological markers of effects of atmospheric deposition on forest health. In: National Research Council. Biologic markers of air-pollution stress and damage in forests. Washington, DC: National Academy Press: 217-232.
- McGregor, Wm. H. Davis; Reardon, John C. 1988. Response of shortleaf pine families to acidic precipitation and ozone stress in the piedmont of South Carolina. In: Carey, Ann; Blair, Roger; Saint, Chris, eds. Forest Response Program annual meeting: project status report; 1988 February 22-26; Corpus Christi, TX. Raleigh, NC: North Carolina State University, Atmospheric Impacts Research Program: 93-94. Vol. 1.
- McLaughlin, S.B. 1989. Carbon allocation processes as indicators of pollutant impacts on forest trees. In: National Research Council. Biologic markers of air-pollution stress and damage in forests. Washington, DC: National Academy Press: 293-302.
- McLaughlin, S.B.; Adams, M.B.; Edwards, N.T.; Hanson, P.J.; Layton, P.A.; Norby, R.J.; O'Neill, E.G. 1988. Comparative sensitivity, mechanisms, and whole plant physiological implications of responses of loblolly pine genotypes to ozone and acid deposition. In: Carey, Ann; Blair, Roger; Saint, Chris, eds. Forest Response Program annual meeting: project status report; 1988 February 22-26; Corpus Christi, TX. Raleigh, NC: North Carolina State University, Atmospheric Impacts Research Program: 48-52. Vol. 1.
- McLaughlin, S.B.; Adams, M.B.; Edwards, N.T.; Hanson, P.J.; Layton, P.A.; O'Neill, E.G.; Roy, W.K. 1988. Comparative sensitivity, mechanisms, and whole plant physiological implications of responses of loblolly pine genotypes to ozone and acid deposition. ORNL/TM-10777, Environmental Sciences Div. Publ. No. 3105. Oak Ridge, TN: Oak Ridge National Laboratory. 301 p.

-
- McLaughlin, S.B.; Layton, P.A.; Adams, M.B.; Edwards, N.T.; Hanson, P.J.; O'Neill, E.G.; Roy, W.K. 1994. Growth responses of 53 open-pollinated loblolly pine families to ozone and acid rain. *Journal of Environmental Quality*. 23: 247-257.
- Meadows, J.S.; Hodges, J.D.; Amundson, R.G.; Hinckley, T.M.; Houston, D.R.; Edmonds, R.L.; Switzer, G.L. 1988. Effects of natural and airborne chemical stresses on growth and development of individual trees and forests. Final report submitted to the Southern Commercial Forest Research Cooperative. 513 p. Report on file: Raleigh, NC: U.S. Department of Agriculture, Forest Service.
- Meadows, James S.; Hodges, John D. 1995. Biotic agents of stress in the South. In: Fox, Susan A.; Mickler, Robert A., eds. *Impact of air pollutants on southern pine forests*. New York: Springer-Verlag: 244-280.
- Meier, S.; Grand, L.F.; Schoeneberger, M.M.; Reinert, R.A.; Bruck, R.I. 1990. Growth, ectomycorrhizae and nonstructural carbohydrates of loblolly pine seedlings exposed to ozone and soil water deficit. *Environmental Pollution*. 64: 11-27.
- Meldahl, R.S.; Chappelka, A.H.; Lockaby, B.G.; Kush, J.S.; Jordan, D.N. 1989. First year results of an intensive field research study investigating the effects of atmospheric deposition on loblolly pine growth. Presented: Preparing for the 21st century: global natural resource monitoring and assessments international conference and workshop organized by IUFRO and FAO; 1989 September 24-30; Venice, Italy. 2 p. Abstract. Unpublished abstract on file: Raleigh, NC: U.S. Department of Agriculture, Forest Service.
- Mickler, R.A.; Medlarz, S. 1987. The role of quality assurance in national acid rain research. *Environmental Technology Letters*. 8: 459-466.
- Mickler, Robert A. 1995. Southern pine forests of North America. In: Fox, Susan A.; Mickler, Robert A., eds. *Impact of air pollutants on southern pine forests*. New York: Springer-Verlag: 19-57.
- Mitchell, Robert J.; Carter, Gregory A.; Chappelka, Arthur H.; Brewer, Charles H. 1990. Effect of ozone and acid precipitation on the spectral reflectance of loblolly pine. *Bulletin of the Ecological Society of America*. 71(2, Supplement): 258. Abstract.
- Mudano, J.E.; Allen, H.L.; Kress, L.W. 1992. Stem and foliage elongation of young loblolly pine as affected by ozone. *Forest Science*. 38(2): 324-335.
- Nkedi-Kizza, P.; Jessup, R.; Owusu-Yaw, J. 1990. Comparison of solution sampler and effluent breakthrough curves for triticum and pesticides obtained from a soil column. *Agronomy Abstracts*: 216. Abstract.
- Nkedi-Kizza, P.; Owusu-Yaw, J. 1992. Simultaneous high-performance liquid chromatographic determination of nitrate, nitrite, and organic pesticides in soil solution using a multidimensional column with ultraviolet detection. *Journal of Environmental Science and Health*. 27A(1): 245-259.

-
- Nkedi-Kizza, P.; Owusu-Yaw, J.; Awuma, K. 1989. Determination of nitrate, nitrite, and pesticides in soil extracts using a multi-dimensional column for ion exchange and reversed phase chromatography. *Agronomy Abstracts*: 203. Abstract.
- Nkedi-Kizza, P.; Rao, P.S.C.; Sawka, G.; Gaston, L.A. 1987. Spatial variability of soil morphological characteristics in a Florida flatwoods. *Agronomy Abstracts*: 160. Abstract.
- Paynter, V.A.; Reardon, J.C.; Shelburne, V.B.; McGregor, Wm. H.D. 1989. Growth and physiological changes of shortleaf pine seedlings exposed to acid rain and ozone. *Plant Physiology*. 89(4, Supplement): 127. Abstract.
- Paynter, Valerie A.; Reardon, John C. 1992. The effects of ozone and acid rain on diurnal carbohydrate flux in shortleaf pine (*Pinus echinata* Mill.) needles. In: Flagler, Richard B., ed. The response of southern commercial forests to air pollution: transactions; 1991 November 4-7; Atlanta, GA. A&WMA Transactions Ser. TR-21. Pittsburgh, PA: Air & Waste Management Association: 247-256.
- Paynter, Valerie A.; Reardon, John; McGregor, Wm. H. Davis. 1989. Effects of acid rain and ozone on growth and physiology of pine seedlings. *Bulletin of the South Carolina Academy of Science*. 51: 81. Abstract.
- Paynter, Valerie A.; Reardon, John C.; Shelburne, Victor B. 1990. Carbohydrate and chlorophyll profiles in shortleaf pine (*Pinus echinata* mill.) needles exposed to acid rain and ozone. In: Bongarten, B.C.; Dougherty, P.M.; Teskey, R.O., comps. Program and abstracts from the 11th North American forest biology workshop; 1990 June 13-15; Athens, GA. Athens, GA: University of Georgia: 8. Abstract.
- Paynter, Valerie A.; Reardon, John C.; Shelburne, Victor B. 1991. Carbohydrate changes in shortleaf pine (*Pinus echinata* Mill.) needles exposed to acid rain and ozone. *Canadian Journal of Forest Research*. 21: 666-671.
- Paynter, Valerie A.; Reardon, John C.; Shelburne, Victor B. 1992. Changing carbohydrate profiles in shortleaf pine (*Pinus echinata*) after prolonged exposure to acid rain and ozone. *Canadian Journal of Forest Research*. 22: 1556-1561.
- Paynter, Valerie A.; Reardon, John C.; Shelburne, Victor B. 1992. Ozone and acid rain effects on total carbohydrate and chlorophyll content of shortleaf pine needles: 1st, 2nd and 3rd year harvests. In: Berglund, Ronald L., ed. Tropospheric ozone and the environment, 2: transactions; 1992 November 4-7; Atlanta, GA. A&WMA Transactions Ser. TR-20. Pittsburgh, PA: Air & Waste Management Association: 580-593.
- Peet, Robert K.; Christensen, Norman L. 1987. Competition and tree death. *BioScience*. 37(8): 586-595.
- Peterson, Charles E.; Mattson, Kim G.; Mickler, Robert A. 1989. Seedling response to sulfur, nitrogen, and associated pollutants. EPA/600/3-89/081. Corvallis, OR: U.S. Environmental Protection Agency. 104 p.

-
- Qiu, Z.; Chappelka, A.H.; Somers, G.L.; Lockaby, B.G.; Meldahl, R.S. 1992. Effects of ozone and simulated acidic precipitation on above- and below-ground growth of loblolly pine (*Pinus taeda* L.). *Canadian Journal of Forest Research*. 22: 582-587.
- Qiu, Z.; Chappelka, A.H.; Somers, G.L.; Lockaby, B.G.; Meldahl, R.S. 1993. Effects of ozone and simulated acidic precipitation on ectomycorrhizal formation on loblolly pine seedlings. *Environmental and Experimental Botany*. 33(3): 423-431.
- Qiu, Z.; Chappelka, A.H.; Somers, G.L.; Lockaby, B.G.; Meldahl, R.S.; Kush, J.S. 1990. The effects of ozone and acid rain on root growth and ectomycorrhizal colonization of field-grown loblolly pine. In: Conference abstracts, international conference on acidic deposition: its nature and effects; 1990 September 16-21; Glasgow, Scotland. Glasgow: Royal Society of Edinburgh: 106. Abstract.
- Qiu, Zhiyuan. 1991. Effects of ozone and acid precipitation on growth, biomass production and ectomycorrhizal development of loblolly pine seedlings. Auburn, AL: Auburn University, Department of Forestry. 89 p. M.S. thesis.
- Rawlings, John O.; Spruill, Susan E. 1994. Estimating pine seedling response to ozone and acidic rain. In: Lange, Nicholas; Ryan, Louise; Billard, Lynne; Brillinger, David; Conquest, Loveday; Greenhouse, Joel, eds. Case studies in biometry. New York: John Wiley and Sons: 81-106.
- Rawlings, John O.; Spruill, Susan E. 1992. Response model synthesis of the Southern Commercial Forest Research data. In: Flagler, Richard B., ed. The response of southern commercial forests to air pollution: transactions; 1991 November 4-7; Atlanta, GA. A&WMA Transactions Ser. TR-21. Pittsburgh, PA: Air & Waste Management Association: 187-205.
- Reardon, J.C.; Shelburne, V.B.; Paynter, V.A. 1989. Physiological responses of shortleaf pine seedlings to acid rain and ozone exposure. In: Weaver, Linda A., ed. Proceedings, 6th annual Gatlinburg acid rain conference; 1989 October 30-31; Gatlinburg, TN. Knoxville, TN: Tennessee Valley Authority: 49. Abstract.
- Reardon, J.C.; Shelburne, V.B.; Paynter, V.A. 1989. The influence of ozone and acid rain on the growth and leaf area of shortleaf pine seedlings. *Agronomy Abstracts*: 120. Abstract.
- Reardon, John C.; Paynter, Valerie A.; Shelburne, Victor B. 1992. Biomass and carbohydrate allocation of shortleaf pine seedlings exposed to ozone and acid rain. In: Flagler, Richard B., ed. The response of southern commercial forests to air pollution: transactions; 1991 November 4-7; Atlanta, GA. A&WMA Transactions Ser. TR-21. Pittsburgh, PA: Air & Waste Management Association: 173-186.
- Reddy, G.B.; Reinert, R.A.; Eason, Gwen. 1991. Effect of acid rain and ozone on soil and secondary needle nutrients of loblolly pine. In: Wright, R.J.; Baligar, V.C.; Murrmann, R.P., eds. Plant-soil interactions at low pH: Proceedings of the 2nd international symposium; 1990 June 24-29; Beckley, WV. Dordrecht, The Netherlands: Kluwer Academic Publishers: 139-145.

-
- Reddy, G.B.; Reinert, R.A.; Eason, Gwen. 1991. Enzymatic changes in the rhizosphere of loblolly pine exposed to ozone and acid rain. *Soil Biology and Biochemistry*. 23(12): 1115-1119.
- Reddy, G.B.; Reinert, R.A.; Palmer, G.; Schoeneberger, M. 1991. Effect of acid rain and ozone on soil nutrients and growth of loblolly pine. In: Plant-soil interactions at low pH, program and abstracts: 2nd international symposium; 1990 June 24-29; Beckley, WV. Beckley, WV: U.S. Department of Agriculture, Agriculture Research Service, Appalachian Soil and Water Conservation Research Laboratory: 54. Abstract.
- Reinert, R.A.; Shafer, S.R.; Eason, G.; Horton, S.J.; Schoeneberger, M.M.; Wells, C. 1988. Responses of loblolly pine half-sib families to ozone. 81st annual meeting of the Air Pollution Control Association; 1988 June 19-24; Dallas, TX. Paper No. 88-125.2. Pittsburgh, PA: Air Pollution Control Association. 14 p.
- Reinert, R.A.; Shafer, S.R.; Eason, G.; Schoeneberger, M.M.; Horton, S.J. [Submitted] 1995. Responses of loblolly pine to ozone and simulated acidic rain. *Canadian Journal of Forest Research*.
- Reinert, R.A.; Wells, C.G.; Schoeneberger, M.M.; Shafer, S.R.; Allen, H.L. 1988. Comparative responses of loblolly pine families to simulated acidic rain and ozone. In: Carey, Ann; Blair, Roger; Saint, Chris, eds. Forest Response Program annual meeting: project status report; 1988 February 22-26; Corpus Christi, TX. Raleigh, NC: North Carolina State University, Atmospheric Impacts Research Program: 53-59. Vol. 1.
- Reinert, Richard A.; Schoeneberger, M.N. [M.]; Shafer, S.R.; Wells, C.G.; Allen, H.L. 1987. Comparative responses of loblolly pine families to ozone and simulated acid rain. In: Terrestrial effects task group (5) peer review: summaries, session C; 1987 March 8-13; Atlanta, GA. Washington, DC: National Acid Precipitation Assessment Program: 7-17.
- Richardson, C.J.; Sasek, T.W.; Fendick, E.A. 1992. Implications of physiological responses to chronic air pollution for forest decline in the southeastern U.S.A. *Environmental Toxicology and Chemistry*. 11: 1105-1114.
- Richardson, C.J.; Sasek, T.W.; Fendick, E.A.; Kress, L.W. 1992. Ozone exposure-response relationships for photosynthesis in genetic strains of loblolly pine seedlings. *Forest Ecology and Management*. 51: 163-178.
- Richardson, C.J.; Sasek, T.W.; Pistrang, M.J.; Fendick, E.A. 1989. Cumulative effects of acid rain and ozone on loblolly pine physiology. *Bulletin of the Ecological Society of America*. 70(2, Supplement): 242. Abstract.
- Richardson, Curtis J.; DiGiulio, Richard T. 1988. Effects of gaseous pollutants and acid precipitation on open-top chambered loblolly seedlings in Duke Forest: physiology and biochemistry. In: Carey, Ann; Blair, Roger; Saint, Chris, eds. Forest Response Program annual meeting: project status report; 1988 February 22-26; Corpus Christi, TX. Raleigh, NC: North Carolina State University, Atmospheric Impacts Research Program: 65-69. Vol. 1.

-
- Richardson, Curtis J.; DiGiulio, Richard T.; Tandy, Norman E. 1989. Free-radical mediated processes as markers of air pollution stress in trees. In: National Research Council. Biologic markers of air pollution stress and damage in forests. Washington, DC: National Academy Press: 251-260.
- Richardson, Curtis J.; Sasek, Thomas W. 1988. Response of loblolly pine to chronic doses of ozone for three growing seasons: diagnostic gas exchange analysis. Report to NCASI (National Council of the Paper Industry for Air and Stream Improvement). New York: NCASI. 36 p.
- Richardson, Curtis J.; Sasek, Thomas W. 1990. Carry-over effects of ozone on the physiology of multiple flushes of loblolly pine (*Pinus taeda* L.) seedlings. In: Bongarten, B.C.; Dougherty, P.M.; Teskey, R.O., comps. Program and abstracts from the 11th North American forest biology workshop; 1990 June 13-15; Athens, GA. Athens, GA: University of Georgia: 5. Abstract.
- Richardson, Curtis J.; Sasek, Thomas W. 1988. Diagnostic gas exchange for analyzing functional limitations for branches. In: Winner, William E.; Phelps, Lisa B., eds. Response of trees to air pollution: the role of branch studies - workshop proceedings; 1987 November 5-6; Boulder, CO. Boulder, CO: U.S. Environmental Protection Agency; U.S. Department of Agriculture, Forest Service: 51-74.
- Richardson, Curtis J.; Sasek, Thomas W.; DiGiulio, Richard T. 1990. Use of physiological and biochemical markers for assessing air pollution stress in trees. In: Wang, W.; Gorsuch, J.W.; Lower, W.R., eds. Plants for toxicity assessment. ASTM STP 1091. Philadelphia, PA: American Society for Testing and Materials: 143-155.
- Richardson, Curtis J.; Sasek, Thomas W.; Fendick, Edward A.; Pistrang, Mark J.; Keen, David E. 1988. Diagnostic physiology and biochemistry studies on loblolly pine seedlings grown in open-top chambers. In: 1988 annual report to Southern Commercial Forest Research Cooperative. Unpaged. Manuscript on file: Raleigh, NC: U.S. Department of Agriculture, Forest Service.
- Richter, Daniel D. 1991. Effects of acidic deposition on soils. In: Irving, Patricia M., ed. Acidic deposition: state of science and technology: terrestrial, materials, health and visibility effects. Washington, DC: National Acid Precipitation Assessment Program: 16-167 - 16-178. Vol. 3.
- Richter, Daniel D.; Markewitz, Daniel. 1995. Atmospheric deposition and soil resources of the southern pine forest. In: Fox, Susan A.; Mickler, Robert A., eds. Impact of air pollutants on southern pine forests. New York: Springer-Verlag: 315-336.
- Richter, Daniel D.; Schoeneberger, Michele M. 1989. Mechanisms by which regional air pollutants affect forested soils and rhizospheres: the significance of long-term perspectives. In: Noble, Reginald D.; Martin, Juri L.; Jensen, Keith F., eds. Air pollution effects on vegetation including forest ecosystems: proceedings of the 2nd US-USSR symposium; 1988 September 13-25; Corvallis, OR, Raleigh, NC, Gatlinburg, TN. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station: 119-126.

-
- Robarge, Wayne P.; Aneja, Viney P.; Cowling, Ellis B. 1992. Relationship of atmospheric deposition to throughfall chemistry in a coniferous canopy. In: Flagler, Richard B., ed. The response of southern commercial forests to air pollution: transactions; 1991 November 4-7; Atlanta, GA. A&WMA Transactions Ser. TR-21. Pittsburgh, PA: Air & Waste Management Association: 135-147.
- Ruark, G.A.; Thornton, F.C.; Tiarks, A.E.; Lockaby, B.G.; Chappelka, A.H. 1990. Influence of acid precipitation and ozone on rhizosphere chemistry of young loblolly pine. In: Conference abstracts, international conference on acidic deposition: its nature and effects; 1990 September 16-21; Glasgow, Scotland. Glasgow: Royal Society of Edinburgh: 411. Abstract.
- Ruark, G.A.; Thornton, F.C.; Tiarks, A.E.; Lockaby, B.G.; Chappelka, A.H.; Meldahl, R.S. 1991. Exposing loblolly pine seedlings to acid precipitation and ozone: effects on soil rhizosphere chemistry. *Journal of Environmental Quality*. 20: 828-832.
- Ruark, Gregory A.; Blake, John I. 1991. Conceptual stand model of plant carbon allocation with a feedback linkage to soil organic matter maintenance. In: Dyck, W.J.; Mees, C.A., eds. Long-term field trials to assess environmental impacts of harvesting: proceedings, IEA/BE T6/A6 workshop; 1990 February [Date unknown]; [City unknown], FL. IEA/BE T6/A6 Report No. 5, FRI Bull. No. 161. Rotorua, New Zealand: Forest Research Institute: 187-198.
- Sasek, T.W.; Richardson, C.J.; Ho, M. [In review] 1995. Loblolly pine photosynthesis during three years of exposure to acid rain and ozone: implications for forest decline. *New Phytologist*.
- Sasek, Thomas W.; Flagler, Richard B. 1995. Physiological and biochemical effects of air pollutants on southern pines. In: Fox, Susan A.; Mickler, Robert A., eds. Impact of air pollutants on southern pine forests. New York: Springer-Verlag: 425-463.
- Sasek, Thomas W.; Richardson, Curtis J. 1989. Effects of chronic doses of ozone on loblolly pine: photosynthetic characteristics in the third growing season. *Forest Science*. 35(3): 745-755.
- Sasek, Thomas W.; Richardson, Curtis J. 1992. The dose-response approach for characterizing the effects of near-ambient ozone concentrations on photosynthesis. In: Flagler, Richard B., ed. The response of southern commercial forests to air pollution: transactions; 1991 November 4-7; Atlanta, GA. A&WMA Transactions Ser. TR-21. Pittsburgh, PA: Air & Waste Management Association: 257-271.
- Sasek, Thomas W.; Richardson, Curtis J.; Fendick, Edward A.; Bevington, Stephen R.; Kress, Lance W. 1991. Carryover effects of acid rain and ozone on the physiology of multiple flushes of loblolly pine seedlings. *Forest Science*. 37(4): 1078-1098.
- Sasek, Thomas W.; Richardson, Curtis J.; Ho, Mengchi. 1991. Use of estimated cumulative ozone uptake in dose-response relationships for photosynthesis of loblolly pine. *Bulletin of the Ecological Society of America*. 72(2, Supplement): 239. Abstract.

-
- Schoeneberger, Philip. 1995. Soils, geomorphology, and land use of the southeastern United States. In: Fox, Susan A.; Mickler, Robert A., eds. Impact of air pollutants on southern pine forests. New York: Springer-Verlag: 58-82.
- Shafer, S.R.; Reinert, R.A.; Eason, G.; Spruill, S.E. 1993. Analysis of ozone concentration-biomass response relationships among open-pollinated families of loblolly pine. Canadian Journal of Forest Research. 23: 706-715.
- Shafer, S.R.; Schoeneberger, M.M. 1991. Mycorrhizal mediation of plant response to atmospheric change: air quality concepts and research considerations. Environmental Pollution. 73: 163-177.
- Shelburne, V.B.; Reardon, J.C.; Paynter, V.A. 1989. Response of shortleaf pine (*Pinus echinata* Mill.) to acid rain and ozone. Presented: Society of American Foresters annual meeting; 1989 September [Date unknown]; Spokane, WA. 1 p. Abstract. Unpublished abstract on file: Raleigh, NC: U.S. Department of Agriculture, Forest Service.
- Shelburne, Victor B.; Reardon, John C.; Paynter, Valerie A. 1991. The effects of acid rain and ozone exposure on growth parameters of shortleaf pine. In: Coleman, Sandra S.; Neary, Daniel G., comps. and eds. Proceedings of the sixth biennial southern silvicultural research conference; 1990 October 30-November 1; Memphis, TN. Gen. Tech. Rep. SE-70. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station: 323-331.
- Shelburne, Victor B.; Reardon, John C.; Paynter, Valerie A. 1993. The effects of acid rain and ozone on biomass and leaf area parameters of shortleaf pine (*Pinus echinata* Mill.). Tree Physiology. 12(2): 163-172.
- Sheu, Bor-Hung; Chappelka, Arthur H. 1993. Effects of long-term ozone exposure on superoxide dismutase and peroxidase activities in loblolly pine (*Pinus taeda* L.). 86th annual meeting and exhibition, Air & Waste Management Association; 1993 June 13-18; Denver, CO. Paper 93-TA-43.01. Pittsburgh, PA: Air & Waste Management Association. 13 p.
- Smith, Luther A.; Shadwick, Douglas S. 1992. Spatial and temporal variability of wet deposition components in the southern commercial forest region. In: Flagler, Richard B., ed. The response of southern commercial forests to air pollution: transactions; 1991 November 4-7; Atlanta, GA. A&WMA Transactions Ser. TR-21. Pittsburgh, PA: Air & Waste Management Association: 111-122.
- Somerville, Matthew C.; Shadwick, Douglas S.; Meldahl, Ralph S.; Chappelka, Arthur H.; Lockaby, B. Graeme. 1992. Use of a non-linear model in examining growth responses of loblolly pine to ozone and acid precipitation. Atmospheric Environment. 26A(2): 279-286.
- Spruill, S.E.; Richter, D.; Gumpertz, M.L.; Rawlings, J.O.; Allen, H.L. 1993. Use of edaphic variables to control experimental error: a case study on blocking and use of covariance. Soil Science. 156(3): 156-162.

-
- Stow, Tara K.; Allen, H. Lee; Kress, Lance W. 1992. Ozone impacts on seasonal foliage dynamics of young loblolly pine. *Forest Science*. 38(1): 102-119.
- Sutton, Robert L.; Allen, Eric R. 1990. Atmospheric deposition parameters in southern commercial forests. 83rd annual meeting and exhibition, Air & Waste Management Association; 1990 June 24-29; Pittsburgh, PA. Paper No. 90-100.3. Pittsburgh, PA: Air & Waste Management Association. 13 p.
- Sutton, Robert L.; Allen, Eric R. 1990. Measurement of acid deposition components in southern commercial forests. In: Proceedings of the 1990 EPA/A&WMA international symposium on measurement of toxic and related air pollutants; 1990 April 30 - May 3; Raleigh, NC. EPA/600/9-90/026. Pittsburgh, PA: Air & Waste Management Association: 767-773
- Tandy, Norman E.; DiGiulio, Richard T.; Richardson, Curtis J. 1989. Assay and electrophoresis of superoxide dismutase from red spruce (*Picea rubens* Sarg.), loblolly pine (*Pinus taeda* L.) and Scotch pine (*Pinus sylvestris* L.): a method of biomonitoring. *Plant Physiology*. 90: 742-748.
- Taylor Jr., G.E.; Johnston, J.W.; Luxmoore, R.J.; McLaughlin, S.B.; Abner, C.A.; McEvers, J.A.; Baldocchi, D.D.; Mandl, R.H.; Regen, J.A. 1988. Air pollutant exposure of mature forest trees: methodology development and performance evaluation. In: Carey, Ann; Blair, Roger; Saint, Chris, eds. Forest Response Program annual meeting: project status report; 1988 February 22-26; Corpus Christi, TX. Raleigh, NC: North Carolina State University, Atmospheric Impacts Research Program: 117-121. Vol. 1.
- Teskey, R.; Dougherty, P.; Wiselogle, A. 1988. Field investigation of the impacts of ambient air, ozone and tree water relations on net carbon exchange and growth of loblolly pine trees. In: Carey, Ann; Blair, Roger; Saint, Chris, eds. Forest Response Program annual meeting: project status report; 1988 February 22-26; Corpus Christi, TX. Raleigh, NC: North Carolina State University, Atmospheric Impacts Research Program: 114-116. Vol. 1.
- Teskey, R.O.; Dougherty, P.M.; Wiselogle, A.E. 1991. Design and performance of branch chambers suitable for long-term ozone fumigation of foliage in large trees. *Journal of Environmental Quality*. 20(3): 591-595.
- Teskey, Robert O. 1995. Synthesis and conclusions from studies of southern commercial pines. In: Fox, Susan A.; Mickler, Robert A., eds. Impact of air pollutants on southern pine forests. New York: Springer-Verlag: 467-490.
- Teskey, Robert O.; Dougherty, Phillip M. 1991. Effect of ambient levels of ozone on carbon gain of loblolly pine (*Pinus taeda* L.) trees. *Bulletin of the Ecological Society of America*. 72(2, Supplement): 265-266. Abstract.
- Tiarks, A.E.; Meier, C.E.; Flagler, R.B.; Steynberg, E.C. 1992. Sequential extraction of condensed tannins from pine litter of different stages of decomposition. In: Hemmingway, R.W.; Laks, P.E. Plant polyphenols: synthesis, properties, significance. New York: Plenum Press: 597-608.

-
- Toups, B.G.; Anderson, J.D.; Flagler, R.B. 1992. Response of shumard oak seedlings to ozone and moisture stress. In: Flagler, Richard B., ed. The response of southern commercial forests to air pollution: transactions; 1991 November 4-7; Atlanta, GA. A&WMA Transactions Ser. TR-21. Pittsburgh, PA: Air & Waste Management Association: 327. Abstract.
- Toups, Bradley G.; Flagler, Richard B.; Lock, John E. 1990. Alteration of net photosynthesis and foliar chlorophyll content of shortleaf pine as affected by ozone and acid rain. In: Bongarten, B.C.; Dougherty, P.M.; Teskey, R.O., comps. Program and abstracts from the 11th North American forest biology workshop; 1990 June 13-15; Athens, GA. Athens, GA: University of Georgia: 95-96. Abstract.
- Webb, Charles D.; Burkhart, Harold E.; Amateis, Ralph L. 1992. Use of the AIRPTAEDA model to explore the potential effects of ozone stress on stand productivity. In: Flagler, Richard B., ed. The response of southern commercial forests to air pollution: transactions; 1991 November 4-7; Atlanta, GA. A&WMA Transactions Ser. TR-21. Pittsburgh, PA: Air & Waste Management Association: 287-302.
- Wiseloge, A.E. 1991. Response of loblolly pine seedling genetic variation to ozone. In: Proceedings of the 21st southern forest tree improvement conference. 1991 June 17-20; Knoxville, TN. Sponsored Publ. No. 43 of the Southern Forest Tree Improvement Committee: 31-38. Available from: NTIS, Springfield, VA.
- Wiseloge, Arthur. 1990. The effect of acute ozone exposure on net photosynthesis and stomatal conductance of mature loblolly pine (*Pinus taeda* L.). In: Bongarten, B.C.; Dougherty, P.M.; Teskey, R.O., comps. Program and abstracts from the 11th North American forest biology workshop; 1990 June 13-15; Athens, GA. Athens, GA: University of Georgia: 6. Abstract.
- Wiseloge, Arthur. 1989. The effect of ozone on photosynthesis of mature loblolly pine. In: Weaver, Linda A., ed. Proceedings, 6th annual Gatlinburg acid rain conference; 1989 October 30-31; Gatlinburg, TN. Knoxville, TN: Tennessee Valley Authority: 27. Abstract.
- Wiseloge, Arthur; Fong, Franklin. 1988. The effects of seedling age on the phenotypic response of loblolly pine to ozone fumigation. In: Olem, Harvey, ed. Proceedings, 5th annual Gatlinburg acid rain conference; 1988 October 31 - November 1; Gatlinburg, TN. Chattanooga, TN: Tennessee Valley Authority: 51-52. Abstract.
- Wiseloge, Arthur E.; Bailey, James K.; Newton, Ronald J.; Fong, Franklin. 1991. Growth response of loblolly pine (*Pinus taeda* L.) seedlings to ozone fumigation. Environmental Pollution. 71(1): 43-56.
- Wong, B.L.; Melhuish, J.H.; McQuattie, C. 1988. The role of mycorrhizae in the accumulation of trace metals under different pH concentrations in loblolly pine. In: Carey, Ann; Blair, Roger; Saint, Chris, eds. Forest Response Program annual meeting: project status report; 1988 February 22-26; Corpus Christi, TX. Raleigh, NC: North Carolina State University, Atmospheric Impacts Research Program: 70-78. Vol. 1.

-
- Wong, B.L.; Melhuish Jr., J.H.; McQuattie, C.J. 1987. Response of mycorrhizal and non-mycorrhizal loblolly pine seedlings to different pH and Pb concentrations. In: Sylvia, D.M.; Hung, L.L.; Graham, J.H., eds. Mycorrhizae in the next decade, practical applications and research priorities - North American conference on mycorrhizae; 1987 May 3-8; Gainesville, FL. Gainesville, FL: Institute of Food and Agricultural Science, University of Florida: 110.
- Wong, B.L.; Melhuish Jr., J.H.; McQuattie, C.J. 1987. The effect and distribution of Al in mycorrhizal and non-mycorrhizal loblolly pine seedlings. Mycological Society of America Newsletter. 38(1): 56. Abstract.
- Woodman, James N. 1986. [Summary report to the program manager on the] mature tree response workshop, sponsored by Southern Commercial Forest Research Cooperative; 1986 December 8-10; St. Louis, MO. 7 p. Report on file: Raleigh, NC: U.S. Department of Agriculture, Forest Service.
- Wright, L.; Thornton, F.; Meldahl, R.; Lockaby, B.G.; Chappelka, A.H. 1989. Acid precipitation and ozone influences on nitrogen nutrition of young loblolly pine. Agronomy Abstracts: 313. Abstract.
- Wright, L.M.; Lockaby, B.G.; Chappelka, A.H.; Meldahl, R.S. 1991. Effects of acid precipitation and ozone on nutrient balance in loblolly pine. Agronomy Abstracts: 357. Abstract.
- Wright, L.M.; Lockaby, B.G.; Meldahl, R.; Thornton, F.; Chappelka, A.H. 1990-1991. The influence of acid precipitation and ozone on nitrogen nutrition of young loblolly pine. Water, Air, and Soil Pollution. 54: 135-142. [Special issue: Management of nutrition in forests under stress: IUFRO symposium; 1989 September 18-21; Freiburg, West Germany].
- Zeide, Boris. 1992. Reevaluation of forest inventory data from loblolly pine stands in the Georgia piedmont and mountain areas. In: Flagler, Richard B., ed. The response of southern commercial forests to air pollution: transactions; 1991 November 4-7; Atlanta, GA. A&WMA Transactions Ser. TR-21. Pittsburgh, PA: Air & Waste Management Association: 17-35.
-

Spruce-Fir Research Cooperative

- Adams, H.S.; McLaughlin, S.B.; Blasing, T.J.; DuVick, D.N. 1990. A survey of radial growth trends in spruce in the Great Smoky Mountains National Park as influenced by topography, age, and stand development. ORNL/TM-11424. Oak Ridge, TN: Oak Ridge National Laboratory. 69 p.
- Adams, M.B.; Eagar, C.C. 1991. Effects of acid deposition on high elevation spruce-fir forests in the United States. In: Longhurst, J.W., ed. Acid deposition: origins, impacts and abatement strategies. Springer-Verlag, New York: 75-89.
- Adams, M.B.; Nichols, D.S.; Federer, C.A.; Jensen, K.F.; Parrott, H. 1991. Screening procedure to evaluate effects of air pollution on eastern region wildernesses cited as class I air quality areas. Gen. Tech. Rep. NE-51. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station. 33 p.
- Adams, Mary Beth; Eagar, Christopher. 1992. Impacts of acidic deposition on high-elevation spruce-fir forests: results from the Spruce-Fir Research Cooperative. Forest Ecology and Management. 51(1-3): 195-205.
- Agmata, A. 1989. Seed quality of *Picea rubens* Sarg., *Abies balsamea* (L.) Mill., and *Abies fraseri* (Pursh.) Poir. in declining spruce-fir forests of eastern North America. Starksville, MS: Mississippi State University. Ph.D. dissertation. 168 p.
- Agmata, A.; Bonner, F.T. 1988. Seed quality of red spruce and Fraser fir in high elevation stands. In: Hertel, G.D., tech. coord. Effects of atmospheric pollutants on the spruce-fir forests of the eastern United States and the Federal Republic of Germany. Proceedings of the United States/Federal Republic of Germany research symposium; 1987 October 19-23; Burlington, VT. Gen. Tech. Rep. NE-120. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station. 543 p.
- Alscher, R.G.; Amundson, R.G.; Cumming, J.R.; Fellows, S.; Fincher, J.; Rubin, G. [and others]. 1989. Seasonal changes in the pigments, carbohydrates and growth of red spruce as affected by ozone. New Phytologist. 113: 211-223.
- Alscher, R.G.; Cumming, J.R.; Fincher, J. 1989. Air pollutant - low temperature interaction in trees. In: National Research Council symposium: biologic markers of air pollution stress and damage in forests; 1989 April 23-28; Little Switzerland, NC. Washington, DC: National Academy Press: 341-345.
- Alscher, Ruth Grene. 1989. Biosynthesis and antioxidant function of glutathione in plants. Physiologia Plantarum. 77: 457-464.
- Alscher, Ruth Grene; Madamanchi, Nageswara Rao; Cramer, Carole L. 1991. Protective mechanisms in the chloroplast stroma. In: Pell, E.; Steffen, K., comps., eds. Active oxygen/oxidative stress and plant metabolism. Rockville, MD: American Society of Plant Physiologists: 145-155.

-
- Amundson, R.G.; Alscher, R.G.; Fellows, S.; Rubin, G.; Fincher, J. [and others]. 1991. Seasonal changes in the pigments, carbohydrates and growth of red spruce as affected by exposure to ozone for two growing seasons. *New Phytologist*. 118: 127-137.
- Amundson, R.G.; Hadley, J.L.; Fincher, J.F.; Fellows, S.; Alscher, R.G. 1992. Comparisons of seasonal changes in photosynthetic capacity, pigments, and carbohydrates of healthy sapling and mature red spruce and of declining and healthy red spruce. *Canadian Journal of Forest Research*. 22(11): 1605-1616.
- Amundson, R.G.; Kohut, R.J.; Laurence, J.A. 1991. Mineral nutrition, carbohydrate content and cold tolerance of foliage of potted red spruce exposed to ozone and simulated acidic precipitation treatments. In: Zottl, H.W.; Huttli, R.F., eds. *Proceedings of the international symposium, management of nutrition in forests under stress; 1989 September 18-21; Freiburg, Germany*. Dordrecht, The Netherlands: Kluwer Academic Publishers: 175-182.
- Amundson, R.; Laurence, J.; Weinstein, D.; Kohut, R. 1992. Research results: cold tolerance in red spruce. Mechanistic research on plant response to environmental stress (ROPIS) newsletter. Palo Alto, CA: Electric Power Research Institute. 3(1): 4 p. In cooperation with: U.S. Department of Agriculture, Forest Service, Spruce-Fir Research Cooperative, Radnor, PA.
- Amundson, Robert G.; Kohut, Robert J.; Laurence, John A. 1991. Mineral nutrition, carbohydrate content and cold tolerance of foliage of potted red spruce exposed to ozone and simulated acidic precipitation treatments. *Water, Air, and Soil Pollution*. 54: 175-182.
- Andersen, Christian P.; McLaughlin, Samuel B. 1991. Seasonal changes in shoot water relations of *Picea rubens* at two high elevation sites in the Smoky Mountains. *Tree Physiology*. 8: 11-21.
- Andersen, Christian P.; McLaughlin, Samuel B.; Roy, W. Kelly. 1991. A comparison of seasonal patterns of photosynthate production and use in branches of red spruce saplings at two elevations. *Canadian Journal of Forest Research*. 21: 455-461.
- Andersen, Christian P.; McLaughlin, Samuel B.; Roy, W. Kelly. 1991. Foliar injury symptoms and pigment concentrations in red spruce saplings in the Southern Appalachians. *Canadian Journal of Forest Research*. 21: 1119-1123.
- Aneja, Viney P.; Businger, Steven; Li, Zheng; Claiborn, Candis S.; Murthy, Anuradha. 1991. Ozone climatology at high elevations in the Southern Appalachians. *Journal of Geophysical Research*. 96(D1): 1007-1021.
- Aneja, Viney P.; Claiborn, Candis S.; Li, Zheng; Murthy, Anuradha. 1990. Exceedances of the national ambient air quality standard for ozone occurring at a "pristine" area site. *Journal of Air & Waste Management Association*. 40(2): 217-220.
- Aneja, Viney P.; Robarge, Wayne P.; Claiborn, Candis S.; Murthy, Anuradha; Soo-Kim, D.; Li, Zheng. 1992. Chemical climatology of high elevation spruce-fir forests in the Southern Appalachian mountains. *Environmental Pollution*. 75: 89-96.

-
- Battles, J.J.; Johnson, A.J.; Siccama, T.G. 1988. Relationship between red spruce decline and forest characteristics at Whiteface Mountain, New York. In: Binkley, D.; Driscoll, C.T.; Allen, H.L.; Schoeneberger, P.; McAvoy, D. 1989. Acidic deposition and forest soils: context and case studies in the Southeastern United States. Ecological Studies Vol. 72. New York: Springer-Verlag. 149 p.
- Battles, John J.; Johnson, Arthur H.; Siccama, Thomas G.; Friedland, Andrew J.; Miller, Eric K. 1992. Red spruce death: effects on forest composition and structure on Whiteface Mountain, New York. Bulletin of the Torrey Botanical Club. 119(4): 418-430.
- Berlyn, G.P.; Anoruo, A.O.; Johnson, A.H.; Vann, D.R.; Strimbeck, G.R.; Boyce, R.L.; Silver, W.L. 1993. Effects of filtered air misting treatments on cuticles of red spruce needles on Whiteface Mountain. New York Journal of Sustainable Forestry. 1(1): 25-47.
- Berlyn, Graeme P.; Royte, Joshua L.; Anoruo, Ambrose O. 1991. Cytophotometric differentiation of high elevation spruces: physiological and ecological implications. Stain Technology. 65(1): 1-14.
- Bobola, Michael S.; Eckert, Robert T.; Akein, Anita S. 1992. Restriction fragment variation in the nuclear ribosomal DNA repeat unit within and between *Picea rubens* and *Picea mariana*. Canadian Journal of Forest Research. 22: 255-263.
- Bondietti, E.A.; Baes, C.F.; McLaughlin, S.B. 1989. The potential of trees to record aluminum mobilization changes in alkaline earth availability. In: National Research Council symposium: biologic markers of air pollution stress and damage in forests; 1989 April 23-28; Little Switzerland, NC. Washington, DC: National Academy Press: 281-292.
- Bondietti, E.A.; Baes III, C.F.; McLaughlin, S.B. 1989. Radial trends in cation ratios in tree rings as indicators of the impact of atmospheric deposition on forests. Canadian Journal of Forest Research. 19: 586-594.
- Bondietti, E.A.; McLaughlin, S.B. 1992. Evidence of historical influences of acidic deposition on wood and soil chemistry. In: Johnson, D.W.; Lindberg, S.E., eds. Atmospheric Deposition and Forest Nutrient Cycling. New York: Springer-Verlag: 358-377.
- Bonner, F.T.; Agmata-Paliwal, A. 1992. Rapid tests of seed quality in *Picea* species by the leachate conductivity method. In: DeHayes, Donald H.; Hawley, Gary J., eds. Proceedings of the 1st Northern Forest Genetics Association conference; conference theme: "Genetics in forest biology;" 1991 July 23-25; Burlington, VT. Berea, KY: Northern Forest Genetics Association: 69-75.
- Boyce, Richard L.; Friedland, Andrew J.; MacDonald, Venessa N. 1992. Modeling shoot water contents in high-elevation *Picea rubens* during winter. Tree Physiology. 11: 341-355.
- Boyce, Richard L.; Friedland, Andrew J.; Webb, Elizabeth T.; Herrick, Graham T. 1991. Modeling the effect of winter climate on high-elevation red spruce shoot water contents. Forest Science. 37(6): 1567-1580.

-
- Boyce, Richard L.; McCure, Delbert C. 1992. Water holdup capacity and residence time of red spruce and balsam fir branches. *Trees*. 6: 19-27.
- Bruck, R.I. 1988. Interactions of spruce-fir pathogens, insects and ectomycorrhizae on the etiology and epidemiology of boreal montane forest decline in the Southern Appalachian mountains. In: Hertel, G.D., tech. coord. Effects of atmospheric pollutants on the spruce-fir forests of the eastern United States and the Federal Republic of Germany. Proceedings of the United States/Federal Republic of Germany research symposium; 1987 October 19-23; Burlington, VT. Gen. Tech. Rep. NE-120. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station: 133-143.
- Bruck, R.I. 1989. Survey of diseases and insects of Fraser fir and red spruce in the Southern Appalachian Mountains. *European Journal of Forest Pathology*. 19: 389-398.
- Bruck, R.I.; Robarge, W.P. 1988. Changes in forest structure in the boreal montane ecosystems of Mt. Mitchell, North Carolina. *European Journal of Forest Pathology*. 18: 357-366.
- Bruck, R.I.; Robarge, W.P.; McDaniel, A. 1991. Decline in the boreal montane ecosystems of the Southern Appalachian Mountains - USA, the air pollution factor. In: Luria, M.; Steinberger, Y.; Spanier, E., eds. Proceedings of the 4th international conference of the Israel Society for Ecology and Environmental Quality Sciences; 1989 June 4-8; Jerusalem, Israel. Volume IV/A. Jerusalem, Israel: Israel Society for Ecology and Environmental Quality Sciences: 259-268.
- Bruck, R.I.; Robarge, W.P.; McDaniel, A. 1989. Forest decline in the boreal montane ecosystems of the Southern Appalachian Mountains. *Water, Air, and Soil Pollution*. 48: 161-180.
- Cannon Jr., William N. 1990. Olfactory response of eastern spruce budworm larvae to red spruce needles exposed to acid rain and elevated levels of ozone. *Journal of Chemical Ecology*. 16(12): 3255-3261.
- Cape, J.N.; Leith, I.D.; Fowler, D.; Murray, M.B.; Sheppard, L.J.; Eamus, D.; Wilson, R.H.F. 1991. Sulphate and ammonium in mist impair the frost hardening of red spruce seedlings. *New Phytologist*. 118(1): 119-126.
- Cape, J.N.; Sheppard, L.J.; Leith, I.D.; Murray, M.B.; Deans, J.D.; Fowler, D.J. 1988. The effect of acid mist on the frost hardiness of red spruce seedlings. *Aspects of Applied Biology*. 17: 141-149.
- Chen, Y.; Wellburn, A.R. 1989. Enhanced ethylene emissions from red and Norway spruce exposed to acidic mists. *Plant Physiology*. 91: 357-361.
- Chen, Yi-Min; Lucas, Peter W.; Wellburn, Alan R. 1991. Relationship between foliar injury and changes in antioxidant levels in red and Norway spruce exposed to acidic mists. *Environmental Pollution*. 69: 1-15.

-
- Chen, Yi-Min; Tabner, B.J.; Wellburn, A.R. 1990. ACC-independent ethylene formation in brown Norway spruce needles involves organic peroxides rather than hydroperoxides as possible precursors. *Physiological and Molecular Plant Pathology*. 37: 323-337.
- Chen, Yi-Min; Wellburn, Alan R. 1991. Ethylene release from green spruce needles involves a combination of ACC-dependent and independent pathways. *Plant Growth Regulation*. 10: 153-162.
- Cook, E.R.; Johnson, A.H. 1989. Climate change and forest decline: a review of the red spruce case. *Water, Air, and Soil Pollution*. 48: 127-140.
- Cook, E.R.; Johnson, A.H. 1988. Threshold responses and climatic change: possible contributors to the decline of red spruce. In: Hertel, G.D., tech. coord. Effects of atmospheric pollutants on the spruce-fir forests of the eastern United States and the Federal Republic of Germany. Proceedings of the United States/Federal Republic of Germany research symposium; 1987 October 19-23; Burlington, VT. Gen. Tech. Rep. NE-120. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station: 311-322.
- Cook, E.R.; Johnson, A.H.; Blasing, T.J. 1987. Forest decline: modeling the effect of climate in tree rings. *Tree Physiology*. 3: 27-40.
- Cook, Edward; Innes, John. 1989. Tree-ring analysis as an aid to evaluating the effects of air pollution on tree growth. In: Biological markers of air-pollution stress and damage in forests; 1989 April 23-28; Little Switzerland, NC. Washington, DC: National Academy Press: 157-168.
- Cook, Edward R. 1990. Bootstrap confidence intervals for red spruce ring-width chronologies and an assessment of age-related bias in recent growth trends. *Canadian Journal of Forest Research*. 20: 1326-1331.
- Cook, Edward R.; Zedaker, Shephard M. 1992. The dendroecology of red spruce decline. In: Eagar, Christopher; Adams, Mary Beth, eds. Ecology and decline of red spruce in the eastern United States. New York: Springer-Verlag: 192-231.
- Craig, B.E.; Friedland, A.J. 1991. Spatial patterns in forest composition and standing dead red spruce in montane forests of the Adirondacks and Northern Appalachians. *Environmental Monitoring and Assessment*. 18: 129-143.
- Cumming, J.R.; Alscher, R.G.; Chabot, J.; Weinstein, L.H. 1988. Effects of ozone on the physiology of red spruce seedlings. In: Hertel, G.D., tech. coord. Effects of atmospheric pollutants on the spruce-fir forests of the eastern United States and the Federal Republic of Germany. Proceedings of the eastern United States/Federal Republic of Germany research symposium; 1987 October 19-23; Burlington, VT. Gen. Tech. Rep. NE-120. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station: 355-370.

-
- Cumming, J.R.; Fincher, J.; Alscher, R.G. 1989. Ozone and the winter injury hypothesis in forest decline. In: Noble, Reginald D.; Martin, Juri L.; Jensen, Keith F., eds. Air pollution effects on vegetation: including forest ecosystems: Proceedings of the 2nd US-USSR symposium; 1989 September 13-25; Raleigh, NC. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station: 105-110.
- Deans, J.D.; Leith, I.D.; Sheppard, L.J.; Cape, J.N.; Fowler, D. [and others]. 1990. The influence of acid mists on growth, dry matter partitioning, nutrient concentrations and mycorrhizal fruiting bodies in red spruce seedlings. *New Phytologist*. 115: 459-464.
- DeHayes, D.H.; Hawley, G.J. 1992. Genetic implications in the decline of red spruce. *Water, Air, and Soil Pollution*. 62: 233-248.
- DeHayes, D.H.; Hawley, G.J. 1989. Genetic uniformity: a factor in spruce decline? *Diversity*. 16: 22-23.
- DeHayes, D.H.; Ingle, M.A.; Waite, C.E. 1989. Nitrogen fertilization enhances cold tolerance of red spruce seedlings. *Canadian Journal of Forest Research*. 19: 1034-1043.
- DeHayes, D.H.; Thornton, F.C.; Waite, C.E.; Ingle, M.A. 1991. Ambient cloud deposition reduces cold tolerance of red spruce seedlings. *Canadian Journal of Forest Research*. 21: 1292-1295.
- DeHayes, D.H.; Waite, C.E.; Ingle, M.A. 1990. Storage temperature and duration influence cold tolerance of red spruce foliage. *Forest Science*. 36(4): 1153-1158.
- DeHayes, D.H.; Waite, C.E.; Ingle, M.A.; Williams, M.W. 1990. Winter injury susceptibility and cold tolerance of current and year-old needles of red spruce trees from several Provenances. *Forest Science*. 36(4): 982-994.
- DeHayes, D.H.; Williams Jr., M.W. 1989. Critical temperature: a quantitative method of assessing cold tolerance. Gen. Tech. Rep. NE-134. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station. 6 p.
- DeHayes, Donald H. 1992. Winter injury and developmental cold tolerance of red spruce. In: Eagar, Christopher; Adams, Mary Beth, eds. *Ecology and decline of red spruce in the eastern United States*. New York: Springer-Verlag: 295-337.
- Demeritt, M.E. 1988. Seed and seedlings for the Spruce-Fir Research Cooperative. In: Hertel, G.D., tech. coord. *Effects of atmospheric pollutants on the spruce-fir forests of the eastern United States and the Federal Republic of Germany*. Proceedings of the United States/Federal Republic of Germany research symposium; 1987 October 19-23; Burlington, VT. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station: 67-68.

-
- Dull, C.W.; Ward, J.D.; Brown, H.D.; Ryan, G.W. 1988. Evaluations of tree mortality in the spruce-fir forest of the southeastern United States. In: Hertel, G.D., tech. coord. Effects of atmospheric pollutants on the spruce-fir forests of the eastern United States and the Federal Republic of Germany. Proceedings of the United States/Federal Republic of Germany research symposium; 1987 October 19-23; Burlington, VT. Gen. Tech. Rep. NE-120. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station: 107-110.
- Dull, C.W.; Ward, J.D.; Brown, H.D.; Ryan, G.W.; Clerke, W.H.; Uhler, R.J. 1988. Evaluations of spruce and fir mortality in the Southern Appalachian Mountains. Protec. Rep. R8-PR13. Atlanta, GA: U.S. Department of Agriculture, Forest Service, Southern Region. 92 p.
- Eagar, Christopher; Adams, Mary Beth, eds. 1992. Ecology and decline of red spruce in the eastern United States. Ecological Studies 96. New York: Springer-Verlag. 417 p.
- Eamus, D.; Fowler, D. 1990. Photosynthetic and stomatal conductance responses to acid mist of red spruce seedlings. *Plant Cell Environment*. 13: 349-357.
- Eamus, D.; Leith, I.D.; Fowler, D.J. 1989. Water relations of red spruce seedlings treated with acid mist. *Tree Physiology*. 5: 387-397.
- Eckert, R.T. 1989. Genetic variation in red spruce and its relation to forest decline in the northeastern United States. In: Bucher, J.; Bucher-Wallin, I., eds. Proceedings of the International Union of Forestry Research Organizations conference on air pollution and forest decline; 1988 October 2-8; Interlaken, Switzerland. Birmensdorf, Switzerland: IUFRO: 319-324.
- Eckert, R.T.; O'Malley, D.M. 1988. Population genetic variation in New England red spruce. In: Hertel, G.D., tech coord. Effects of atmospheric pollutants on the spruce-fir forests of the eastern United States and the Federal Republic of Germany. Proceedings of the United States/Federal Republic of Germany research symposium; 1987 October 19-23; Burlington, VT. Gen. Tech. Rep. NE-120. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station: 323-328.
- Ennis, C.A.; Lazrus, A.L.; Zimmerman, P.R. 1990. Flux determinations and physiological response in the exposure of red spruce to gaseous hydrogen peroxide, ozone, and sulfur dioxide. *Tellus*. 42B: 183-199.
- Ennis, Christine A.; Smith, J.; Lazrus, Allan L. 1993. A preliminary study of the response of red spruce to O₃ and SO₂. *Tellus, Series B*. 45(1): 40-52.
- Erwin, Susan A. 1988. The influences of atmospheric nitrates and annual climatic variables in predisposition to winter desiccation injury in Fraser fir and red spruce. Blacksburg, VA: Virginia Polytechnic Institute and State University. 122 p. M.S. thesis.

- Feldman, S.B.; Zelazny, L.W.; Baker, J.C. 1991a. High-elevation forest soils of the Southern Appalachians: I. Distribution of parent materials and soil-landscape relationships. *Soil Science Society of America Journal*. 55: 1629-1637.
- Feldman, S.B.; Zelazny, L.W.; Baker, J.C. 1991b. High-elevation forest soils of the Southern Appalachians: II. Geomorphology, pedogenesis, and clay mineralogy. *Soil Science Society of America Journal*. 55: 1782-1791.
- Feret, P.P.; Sharik, T.L.; Chevone, B.I.; Pagnelli, D.J.; Moldenhawer, P. 1988. Comparison of reproductive fitness between two Fraser fir populations in the Southern Appalachians. In: Hertel, G.D., tech. coord. Effects of atmospheric pollutants on the spruce-fir forests of the eastern United States and the Federal Republic of Germany. Proceedings of the United States/Federal Republic of Germany research symposium; 1987 October 19-23; Burlington, VT. Gen. Tech. Rep. NE-120. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station: 329-332.
- Fernandez, I.J.; Lawrence, G.B.; Richards, K.J. 1990. Characteristics of foliar chemistry in a commercial spruce-fir stand of Northern New England, USA. *Plant and Soil*. 125: 288-292.
- Fernandez, Ivan J. 1992. Characterization of eastern U.S. spruce-fir soils. In: Eagar, Christopher; Adams, Mary Beth, eds. Ecology and decline of red spruce in the eastern United States. New York: Springer-Verlag: 40-63.
- Fernandez, Ivan J. 1989. Effects of acidic precipitation on soil productivity. In: Adriano, D.C.; Johnson, A.H., comps., eds. Acidic precipitation. Volume 2. Biological and ecological effects. New York: Springer-Verlag: 61-83.
- Fincher, J.; Cumming, J.R.; Alscher, R.G.; Rubin, G.; Weinstein, L.H. 1989. Long term ozone exposure affects winter hardiness of red spruce (*Picea rubens* Sarg.) seedlings. *New Phytologist*. 113: 85-96.
- Fincher, Jean. 1992. Comparison of structural changes in red spruce (*Picea rubens* Sarg.) during cold hardening in mature trees and in seedlings used in pollutant exposure studies. *Forest Ecology and Management*. 51(1-3): 105-113.
- Fowler, D.J.; Cape, J.N.; Deans, J.D.; Leith, I.D.; Murray, M.B.; Smith, R.I.; Sheppard, L.J.; Unsworth, M.B. 1989. Effects of acid mist on the frost hardiness of red spruce seedlings. *New Phytologist*. 113: 321-355.
- Friedland, A.J.; Battles, J.J. 1987. Red spruce (*Picea rubens* Sarg.) decline in the Northeastern United States: review and recent data from Whiteface Mountain. In: Kairiukstis, L.; Nilsson, S.; Straszah, A., eds. Proceedings of the workshop on forest decline and reproduction: regional and global consequences; 1987 March 23-27; Krakow, Poland. Vienne, Austria: International Institute for Applied Systems Analysis: 287-296.
- Friedland, A.J.; Miller, E.K.; Battles, J.J.; Thorne, J.F. 1991. Nitrogen deposition, distribution and cycling in a subalpine spruce-fir forest in the Adirondacks, New-York, USA. *Biogeochemistry*. 14(1): 31-55.

-
- Friedland, Andrew J. 1989. Recent changes in the montane spruce-fir forests of the Northeastern United States. *Environmental Monitoring and Assessment*. 12: 237-244.
- Friedland, Andrew J.; Boyce, Richard L.; Webb, Elizabeth T. 1992. Winter and early spring microclimate of a subalpine spruce-fir forest canopy in Central New Hampshire. *Atmospheric Environment*. 26A(7): 1361-1369.
- Gage, Stephen F.; DeHayes, Donald H. 1992. Variation in seasonal patterns of photosynthesis among red spruce and balsam fir provenances. In: DeHayes, Donald H.; Hawley, Gary J., eds. *Proceedings of the 1st northern forest genetics association conference; 1991 July 23-25; Burlington, VT.* Burlington, VT: The University of Vermont: 109-120.
- Gregoire, T.G.; Zedaker, S.M.; Nicholas, N.S. 1990. Modeling relative error in stem basal area estimates. *Canadian Journal of Forest Research*. 20: 496-502.
- Hadley, Julian L.; Friedland, Andrew J.; Herrick, Graham T.; Amundson, Robert G. 1992. Winter desiccation and solar radiation in relation to red spruce decline in the Northern Appalachians. *Canadian Journal of Forest Research*. 21: 269-272.
- Hanson, P.J.; McLaughlin, S.B. 1989. Growth, photosynthesis and chlorophyll concentrations of red spruce seedlings exposed to H₂O₂ fog. *Journal of Environmental Quality*. 18: 499-503.
- Hedda, Schlegel; Amundson, Robert G.; Huttermann, Aloys. 1992. Element distribution in red spruce (*Picea rubens*) fine roots; evidence for aluminum toxicity at Whiteface Mountain. *Canadian Journal of Forest Research*. 22: 1132-1138.
- Herrick, Graham T.; Friedland, Andrew J. 1990. Patterns of trace metal concentration and acidity in montane forest soils of the Northeastern United States. *Water, Air, and Soil Pollution*. 53: 151-157.
- Herrick, Graham T.; Friedland, Andrew J. 1991. Winter desiccation and injury of subalpine red spruce. *Tree Physiology*. 8: 23-36.
- Hertel, G.D., tech. coord. 1988. Effects of atmospheric pollutants on the spruce-fir forests of the eastern United States and the Federal Republic of Germany. *Proceedings of the United States/Federal Republic of Germany research symposium; 1987 October 19-23; Burlington, VT.* Gen. Tech. Rep. NE-120. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station. 543 p.
- Hertel, G.D.; Zarnoch, S.J.; Arre, T.; Eagar, C.; Mohnen, V.A.; Medlarz, S.A. 1988. Status of the Spruce-Fir Research Cooperative. In: Hertel, G.D., tech. coord. *Effects of atmospheric pollutants on the spruce-fir forests of the eastern United States and the Federal Republic of Germany. Proceedings of the United States/Federal Republic of Germany research symposium; 1987 October 19-23; Burlington, VT.* Gen. Tech. Rep. NE-120. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station: 19-26.

-
- Huntington, T.G.; Peart, D.R.; Hornig, J.J.; Ryan, D.F.; Russo-Savage, S. 1990. Relationships between soil chemistry, foliar chemistry, and condition of red spruce at Mt. Moosilauke, NH. *Canadian Journal of Forest Research*. 20: 1219-1227.
- Huntington, T.G.; Ryan, D.F. 1988. Soil chemical properties in the spruce-fir zone on Mt. Moosilauke in New Hampshire. In: Hertel, G.D., tech. coord. Effects of atmospheric pollutants on the spruce-fir forests of the eastern United States and the Federal Republic of Germany. Proceedings of the United States/Federal Republic of Germany research symposium; 1987 October 19-23; Burlington, VT. Gen. Tech. Rep. NE-120. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station: 191-198.
- Hyink, D.M.; Zedaker, S.M. 1987. Stand dynamics and the evaluation of forest decline. *Tree Physiology*. 3: 17-26.
- Innes, J.L.; Cook, E.R. 1989. Tree-ring analysis as an aid to evaluating the effects of pollution on tree growth. *Canadian Journal of Forest Research*. 19: 1174-1189.
- Irving, Patricia M.; Eagar, Christopher. 1989. Assessment of the importance of acidic fogwater and cloudwater in affecting terrestrial vegetation - some important case studies. In: Proceedings of the 82nd annual meeting and exhibition: Air & Waste Management Association; 1989 June 25-30; Anaheim, CA. Pittsburgh, PA: Air & Waste Management Association: 2-30.
- Jacobson, J.S.; Bethard, T.T.; Heller, L.I.; Lassoie, J.P. 1990. Response to *Picea rubens* seedlings to intermittent mist varying in concentrations of acidity and sulfur- and nitrogen-containing pollutants. *Physiologia Plantarum*. 78: 595-601.
- Jacobson, J.S.; Heller, L.I.; Yamada, K.E.; Osmeloski, J.F.; Bethard, T.; Lassoie, J.P. 1990. Foliar injury and growth response of red spruce to sulfate and nitrate acidic mist. *Canadian Journal of Forest Research*. 20: 58-65.
- Jacobson, J.S.; Lassoie, J.P. 1988. Response of red spruce to sulfur and nitrogen contaminants in simulated acidic mist. In: Hertel, G.D., tech. coord. Effects of atmospheric pollutants on the spruce-fir forests of the eastern United States and the Federal Republic of Germany. Proceedings of the United States/Federal Republic of Germany research symposium; 1987 October 19-23; Burlington, VT. Gen. Tech. Rep. NE-120. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station: 371-380.
- Jacobson, J.S.; Lassoie, J.P.; Osmeloski, J.F.; Yamada, K.E. 1989. Changes in foliar elements in red spruce seedlings after exposure to acidic mist. *Water, Air, and Soil Pollution*. 48: 141-159.

-
- Jensen, K.F.; Patton, R.L.; Schier, G.A. 1988. Effects of simulated acid rain and ozone on red spruce seedlings: an interim report. In: Hertel, G.D., tech. coord. Effects of atmospheric pollutants on the spruce-fir forests of the eastern United States and the Federal Republic of Germany. Proceedings of the United States/Federal Republic of Germany research symposium; 1987 October 19-23; Burlington, VT. Gen. Tech. Rep. NE-120. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station: 413-416.
- Johnson, A.H. 1989. Decline of red spruce in the Northern Appalachians: determining if air pollution is an important factor. In: Proceedings, National Research Council symposium: biologic markers of air pollution stress and damage in forests; 1989 April 23-28; Little Switzerland, NC. Washington, DC: National Academy Press: 91-104.
- Johnson, A.H.; Cook, E.R.; Siccama, T.G. 1988. Tree rings, climate, and red spruce decline. In: Hertel, G.D., tech coord. Effects of atmospheric pollutants on the spruce-fir forests of the eastern United States and the Federal Republic of Germany. Proceedings of the United States/Federal Republic of Germany research symposium; 1987 October 19-23; Burlington, VT. Gen. Tech. Rep. NE-120. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station: 299-310.
- Johnson, A.H.; Friedland, A.J.; Miller, E.K.; Battles, J.J.; Huntington, T.G.; Vann, D.R.; Strimbeck, G.R. 1992. Eastern spruce-fir. In: Johnson, Dale W.; Lindberg, Steven E., eds. Atmospheric deposition and forest nutrient cycling. New York: Springer-Verlag: 496-525.
- Johnson, A.H.; McLaughlin, S.B.; Adams, M.B.; Cook, E.R.; DeHayes, D.H.; Eagar, C. [and others]. 1992. Synthesis and conclusions from epidemiological and mechanistic studies of red spruce decline. In: Eagar, Christopher; Adams, Mary Beth, eds. Ecology and decline of red spruce in the eastern United States. New York: Springer-Verlag: 64-124.
- Johnson, A.H.; Siccama, T.G. 1989. Decline of red spruce in the high-elevation forests of the Northeastern United States. In: MacKenzie, J.J.; El-Ashry, M.T., eds. Air pollution's toll on forests and crops. New Haven, CT: Yale University Press: 191-234.
- Johnson, Arthur H. 1992. The role of abiotic stresses in the decline of red spruce in high elevation forests of the eastern United States. *Annual Review of Phytopathology*. 30: 349-367.
- Johnson, D.W.; Ball, J.T. 1990. Environmental pollution and impacts on soils and forests nutrition in North America. In: Zottl, H.W.; Huttel, R.F., eds. Proceedings of the international symposium, management of nutrition in forests under stress; 1989 September 18-21; Freiburg, Germany. Dordrecht, The Netherlands: Kluwer Academic Publishers: 3-20.

-
- Johnson, D.W.; Friedland, A.J.; Van Miegroet, H.H.; Harrison, R.B.; Miller, E.E.; Lindberg, S.E.; Cole, D.A.; Schaefer, D.A.; Todd, D.E. 1988. Nutrient status of some contrasting high elevation forest sites in the eastern and western United States. In: Hertel, G.D., tech. coord. Effects of atmospheric pollutants on the spruce-fir forests of the eastern United States and the Federal Republic of Germany. Proceedings of the United States/Federal Republic of Germany research symposium; 1987 October 19-23; Burlington, VT. Gen. Tech. Rep. NE-120. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station: 453-460.
- Johnson, D.W.; Taylor Jr., G.E. 1989. Role of air pollution in forest decline in eastern North America. *Water, Air, and Soil Pollution*. 48: 21-43.
- Johnson, D.W.; Van Miegroet, H.; Swank, W.T. 1989. Markers of air pollution in forests: nutrient cycling. In: Proceedings, National Research Council symposium: biologic markers of air pollution stress and damage in forests; 1989 April 23-28; Little Switzerland, NC. Washington, DC: National Academy Press: 91-104.
- Joslin, J.D.; Kelly, J.M.; Van Miegroet, H. 1992. Soil chemistry and nutrition of North American spruce-fir stands - evidence of recent change. *Journal of Environmental Quality*. 21(1): 12-30.
- Johnson, Dale W.; Fernandez, Ivan J. 1992. Soil mediated effects of atmospheric deposition on eastern U.S. spruce-fir forests. In: Eagar, Christopher; Adams, Mary Beth, eds. Ecology and decline of red spruce in the eastern United States. New York: Springer-Verlag: 235-270.
- Johnson, Dale W.; Lindberg, Steven E., eds. 1992. Atmospheric deposition and forest nutrient cycling. *Ecological Studies* 91. New York: Springer-Verlag. 707 p.
- Johnson, Dale W.; Van Miegroet, Helga; Lindberg, Steven E.; Todd, Donald E.; Harrison, Robert B. 1991. Nutrient cycling in red spruce forest of the Great Smoky Mountains. *Canadian Journal of Forest Research*. 21: 769-787.
- Joslin, J.D.; McDuffie, C.; Brewer, P.F. 1988. Acidic cloud water and cation loss from red spruce foliage. *Water, Air, and Soil Pollution*. 39: 355-363.
- Joslin, J.D.; Mueller, S.F.; Wolfe, M.H. 1990. Tests of models of cloudwater deposition to forest canopies using artificial and living collectors. *Atmospheric Environment*. 24A(12): 3007-3019.
- Joslin, J.D.; Wolfe, M.H. 1992. Red spruce soil solution chemistry and root distribution across a cloud water deposition gradient. *Canadian Journal of Forest Research*. 22(6): 893-904.
- Joslin, J.D.; Wolfe, M.H. 1993. Temperature increase accelerates nitrate release from high-elevation red spruce soils. *Canadian Journal of Forest Research*. 23: 756-759.
- Ke, J. Evaluation of foliar symptoms on Norway spruce (*Picea abies* (L.) Karst.) and relationship to nutrient status. State College, PA: Pennsylvania State University. 139 p. M.S. thesis.

-
- Kim, Deug-Soo; Aneja, Viney P. 1992. Chemical composition of clouds at Mt. Mitchell, North Carolina, USA. *Tellus*. 44B: 41-53.
- Kohut, R.J.; Laurence, J.A.; Amundson, R.G. 1988. Evaluation of the effects of ozone and acidic precipitation, alone and in combination on the photosynthesis, nutrition and growth of red spruce. In: Hertel, G.D., tech coord. Effects of atmospheric pollutants on the spruce-fir forests of the eastern United States and the Federal Republic of Germany. Proceedings of the United States/Federal Republic of Germany research symposium; 1987 October 19-23; Burlington, VT. Gen. Tech. Rep. NE-120. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station: 407-412.
- Kohut, R.J.; Laurence, J.A.; Amundson, R.G.; Raba, R.M.; Melkonian, J. 1990. Effects of ozone and acidic precipitation on the growth and photosynthesis of red spruce after two years of exposure. *Water, Air, and Soil Pollution*. 51: 277-286.
- Kraske, C.R.; Fernandez, I.J. 1990. Conifer seedlings' growth response to soil type and selected nitrogen availability indices. *Soil Science Society of America Journal*. 54: 246-251.
- Kraske, C.R.; Fernandez, I.J.; Spencer, C.J. 1989. A comparison of methods for measuring extractable Ca, Mg, K, Na, Mn, Ae, Fe, and P from New England forest soils. *Communications in Soil Science and Plant Analysis*. 20: 439-464.
- Larson, Timothy V.; Vong, Richard J. 1990. A theoretical investigation of the pressure and temperature dependence of atmospheric ozone deposition to trees. *Environmental Pollution*. 67: 179-189.
- Laurence, J.A.; Kohut, R.J.; Amundson, R.G. 1989. Response of red spruce seedlings exposed to ozone and simulated acidic precipitation in the field. *Archive of Environmental Contamination and Toxicology*. 18: 285-290.
- Lawrence, Gregory B.; Fernandez, Ivan J. 1993. A reassessment of areal variability of throughfall deposition measurements. *Ecological Applications*. 3(3): 473-480.
- Lawrence, Gregory B.; Fernandez, Ivan J. 1991. Biogeochemical interactions between acidic deposition and a low-elevation spruce-fir stand in Howland, Maine. *Canadian Journal of Forest Research*. 21: 867-875.
- LeBlanc, David C. 1992. Spatial and temporal variation in the prevalence of growth decline in red spruce populations of the Northeastern United States. *Canadian Journal of Forest Research*. 22: 1351-1363.
- LeBlanc, David C.; Nicholas, N.S.; Zedaker, S.M. 1992. Prevalence of individual-tree growth decline in red spruce populations of the Southern Appalachian Mountains. *Canadian Journal of Forest Research*. 22(6): 905-914.

- Lee, S.W.; Borris, C.I.; Seiler, J.R. 1990. Growth response and drought susceptibility of red spruce seedlings exposed to simulated acidic rain and ozone. *Forest Science*. 36: 265-275.
- Leith, I.D.; Cape, J.N.; Sheppard, L.J.; Murray, M.B.; Deans, J.D.; Fowler, D.J. 1989. Frost hardiness and visible injury of spruce seedlings subjected to simulated acidic mist. In: Bucher, J.; Bucher-Wallin, I., eds. Proceedings of the International Union of Forestry Research Organizations conference on air pollution and forest decline; 1988 October 2-8; Interlaken, Switzerland. Birmensdorf, Switzerland: IUFRO: 175-180.
- Leith, I.D.; Murray, M.B.; Sheppard, L.J.; Cape, J.N.; Deans, J.D.; Smith, R.I.; Fowler, D.J. 1989. Visible foliar injury of red spruce seedlings subjected to simulated acid mist. *New Phytologist*. 113: 313-320.
- L'Hirondelle, Sylvia Jeanne. 1990. Nitrogen and acidic mist affect the growth and physiology of red spruce (*Picea rubens*) seedlings. Ithaca, NY: Cornell University. 180 p. Ph.D. dissertation.
- Li, Zheng; Aneja, Viney P. 1992. Regional analysis of cloud chemistry at high elevations in the eastern United States. *Atmospheric Environment*. 26A(11): 2001-2017.
- Lindberg, S.E.; Owens, J.G. 1993. Throughfall studies of deposition to forest edges and gaps in montane ecosystems. *Biogeochemistry*. 19: 173-194.
- Lucas, P.W.; Cottam, D.A.; Sheppard, L.J.; Francis, B.J. 1988. Growth responses and delayed winter hardening in sitka spruce following summer exposure to ozone. *New Phytologist*. 108: 495-504.
- Madamanchi, Mageswara R.; Hausladen, A.; Alscher, Ruth G.; Amundson, R.G.; Fellows, S. 1991. Seasonal changes in antioxidants in red spruce (*Picea rubens* Sarg.) from three field sites in the Northeastern United States. *New Phytopathology*. 118: 331-338.
- Maguire, L.A.; Chang, H.Y.; Ce, H. 1988. Modeling forest dynamics of the Southern Appalachian spruce-fir ecosystems. In: Hertel, G.D., tech. coord. Effects of atmospheric pollutants of the spruce-fir forests of the eastern United States and the Federal Republic of Germany. Proceedings of the United States/Federal Republic of Germany research symposium; 1987 October 19-23; Burlington, VT. Gen. Tech. Rep. NE-120. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station: 151-162.
- Mandle, R.H.; Kohut, R.J.; Laurence, J.A. 1988. An integrated system for evaluating the effects of ozone and acidic precipitation on the nutrition, growth and physiology of red spruce and sugar maple. *Environmental Pollution*. 53: 444-447.
- Mandle, R.H.; Laurence, J.A.; Kohut, R.J. 1989. Development and testing of large, open-top chambers for exposing large, perennial plants to air pollutants. *Journal of Environmental Quality*. 18: 534-540.
- Marshall, Kimberly A. 1990. Growth, foliar nutrition and cold tolerance responses of balsam fir (*Abies balsamea* (L.) Mill.) populations to nutrient supplements. Burlington, VT: The University of Vermont. 81 p. M.S. thesis.

-
- McLaughlin, S.B. 1989. Carbon allocation processes as indicators of air pollution effects on forests. In: National Research Council symposium: Biologic markers of air pollution stress and damage in forests; 1989 April 23-28; Little Switzerland, NC. Washington, DC: National Academy Press: 293-302.
- McLaughlin, S.B.; Adams, H.S. 1987. Reaction-growth declines in red spruce. *Journal of Forestry*. 85: 50-51.
- McLaughlin, S.B.; Andersen, C.P.; Edwards, N.T.; Roy, W.K.; Layton, P.A. 1990. Seasonal patterns of photosynthesis and respiration of red spruce saplings from two elevations in declining Southern Appalachian stands. *Canadian Journal of Forest Research*. 20: 485-495.
- McLaughlin, S.B.; Andersen, C.P.; Hanson, P.J.; Norby, R.J.; Edwards, N.T.; Tardiff, R.R. 1988. Interactive effects of natural and anthropogenic factors on growth and physiology of southern red spruce. In: Hertel, G.D., tech. coord. Effects of atmospheric pollutants on the spruce-fir forests of the eastern United States and the Federal Republic of Germany. Proceedings of the United States/Federal Republic of Germany research symposium; 1987 October 19-23; Burlington, VT. Gen. Tech. Rep. NE-120. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station: 381-388.
- McLaughlin, S.B.; Andersen, C.P.; Hanson, P.J.; Tjoelker, M.G.; Roy, W.K. 1991. Increased dark respiration and calcium deficiency of red spruce in relation to acidic deposition at high-elevation Southern Appalachian Mountain sites. *Canadian Journal of Forest Research*. 21: 1234-1244.
- McLaughlin, S.B.; Downing, D.J.; Blasing, T.J.; Cook, E.R.; Adams, H.S. 1987. An analysis of climate and competition as contributors to decline of red spruce in high elevation Appalachian forests of the eastern United States. *Oecologia*. 72: 487-501.
- McLaughlin, S.B.; Tjoelker, M.J. 1992. Growth and physiological changes in red spruce saplings associated with acidic deposition at high elevations in the Southern Appalachians, USA. *Forest Ecology and Management*. 51(1-3): 43-51.
- McLaughlin, Samuel B.; Kohut, Robert J. 1992. The effects of atmospheric deposition and ozone on carbon allocation and associated physiological processes in red spruce. In: Eagar, Christopher; Adams, Mary Beth, eds. Ecology and decline of red spruce in the eastern United States. New York: Springer-Verlag: 338-382.
- McNamee, P.; Jones, M.L.; Greig, L.A.; Webb, T.M.; Hertel, G.D.; Zarnoch, S.J. 1988. Research planning for the Spruce-Fir Research Cooperative Program. In: Hertel, G.D., tech. coord. Effects of atmospheric pollutants on the spruce-fir forests of the eastern United States and the Federal Republic of Germany. Proceedings of the United States/Federal Republic of Germany research symposium; 1987 October 19-23; Burlington, VT. Gen. Tech. Rep. NE-120. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station: 5-18.

-
- Meier, S.; Robarge, W.P.; Bruck, R.I.; Grand, L.F. 1989. Effects of simulated acid rain on ectomycorrhizae of red spruce. *Environmental Pollution*. 59: 315-324.
- Miller, E.K.; Huntington, T.G.; Johnson, A.H.; Friedland, A.J. 1992. Aluminum in soil solutions from a subalpine spruce-fir forest at Whiteface Mountain, New York. *Journal of Environmental Quality*. 21: 345-352.
- Mohnen, Volker A. 1992. Atmospheric deposition and pollutant exposure of eastern U.S. forests. In: Eagar, Christopher; Adams, Mary Beth, eds. *Ecology and decline of red spruce in the eastern United States*. New York: Springer-Verlag: 64-124.
- Moldenhawer, P. 1988. In vitro studies of the impact of ozone and sulfur dioxide on pollen of Fraser fir. Blacksburg, VA: Virginia Polytechnic and State University, Department of Forestry. 82 p. M.S. thesis.
- Mueller, Stephen F. 1991. Estimating cloud water deposition to subalpine spruce-fir forests: I. Modifications to an existing model. *Atmospheric Environment*. 25A(5/6): 1093-1104.
- Mueller, Stephen F.; Imhoff, Robert E. 1989. Inferring cloud deposition to a forest canopy using a passive cloudwater collector. *Geophysical Research Letters*. 16(7): 683-686.
- Mueller, Stephen F.; Joslin, John D.; Wolfe, Mark H. 1991. Estimating cloud water deposition to subalpine spruce-fir forests: II. Model testing. *Atmospheric Environment*. 25A(5/6): 1105-1122.
- Mueller, Stephen F.; Weatherford, Frances P. 1988. Chemical deposition to a high elevation red spruce forest. *Water, Air, and Soil Pollution*. 38: 345-363.
- Murray, M.B.; Cape, J.N.; Fowler, D.J. 1989. Quantification of frost damage in plant tissues by rates of electrolyte leakage. *New Phytologist*. 113: 307-311.
- Neighbour, E.A.; Pearson, M.M.; Mehlhorn, H.H. 1990. Purafil-filtration prevents the development of ozone-induced frost injury: a potential role of nitrate oxide. *Atmospheric Environment*. 24A: 711-715.
- Nicholas, N.S.; Gregoire, T.G.; Zedaker, S.M. 1991. The reliability of tree crown position classification. *Canadian Journal of Forest Research*. 21: 698-700.
- Nicholas, N.S.; Zedaker, S.M. 1989. Ice damage in spruce-fir forests of the Black Mountains, North Carolina. *Canadian Journal of Forest Research*. 19: 1487-1491.
- Nicholas, N.S.; Zedaker, S.M.; Eagar, C. 1992. A comparison of overstory community structure in three Southern Appalachian spruce-fir forests. *Bulletin of the Torrey Botanical Club*. 119(3): 316-332.
- Nicholas, N.S.; Zedaker, S.M.; Eagar, C.; Bonner, F.T. 1992. Seedling recruitment and stand regeneration in spruce-fir forests of the Great Smoky Mountains. *Bulletin of the Torrey Botanical Club*. 119(3): 289-299.

-
- Norby, R.J. 1989. Foliar nitrate reductase activity: a marker for assimilation of atmospheric nitrogen oxides. In: National Research Council symposium: biologic markers of air pollution stress and damage in forests; 1989 April 23-28; Little Switzerland, NC. Washington, DC: National Academy Press: 245-250.
- Norby, R.J.; Weerasuriya, Y.Y.; Hanson, P.J. 1989. Induction of nitrate reductase activity in red spruce needles by NO_2 and HNO_3 vapor. *Canadian Journal of Forest Research*. 19: 889-896.
- Pear, D.R.; Conkey, L.E.; Smith, W.H.; Knight, F.B.; Keifer, M.M. 1988. Condition of the spruce-fir forest at Mt. Moosilauke, New Hampshire. In: Hertel, G.D., tech. coord. Effects of atmospheric pollutants on the spruce-fir forests of the eastern United States and the Federal Republic of Germany. Proceedings of the United States/Federal Republic of Germany research symposium; 1987 October 19-23; Burlington, VT. Gen. Tech. Rep. NE-120. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station: 173-182.
- Pear, David R.; Jones, Matthew B.; Palmiotto, Peter A. 1991. Winter injury to red spruce at Mount Moosilauke, New Hampshire. *Canadian Journal of Forest Research*. 21: 1380-1389.
- Pear, David R.; Nicholas, N.S.; Zedaker, Shephard M.; Miller-Weeks, Margaret M.; Siccama, Thomas G. 1992. Condition and recent trends in high-elevation red spruce populations. In: Eagar, Christopher; Adams, Mary Beth, eds. Ecology and decline of red spruce in the eastern United States. New York: Springer-Verlag: 125-191.
- Pear, David R.; Poage, Nathan J.; Jones, Matthew, B. 1992. Winter injury to subalpine red spruce: influence of prior vigor and effects on subsequent growth. *Canadian Journal of Forest Research*. 22: 878-887.
- Pear, Gayle. 1990. A comparison of past growth trends in live and dead red spruce. Hanover, NH: Dartmouth College. 67 p. M.S. thesis.
- Percy, K.E.; Krause, C.R.; Jensen, K.F. 1990. Effects of ozone and acidic fog on red spruce needle epicuticular wax ultrastructure. *Canadian Journal of Forest Research*. 20: 117-120.
- Petty, W.H.; Lindberg, S.E. 1990. An intensive 1-month investigation of trace metal deposition and throughfall at a mountain spruce forest. *Water, Air, and Soil Pollution*. 53: 213-226.
- Pye, J.M.; de Steiguer, J.E.; Love, C.C. 1989. Expert opinion survey on the impacts of air pollutants on forests of the USA. In: Bucher, J.; Bucher-Wallin, I., eds. Proceedings of the International Union of Forestry Research Organizations conference on air pollution and forest decline; 1988 October 2-8; Interlaken, Switzerland. Birmensdorf, Switzerland: IUFRO: 355-360.
- Pyle, C.; Schafale, M.P. 1988. Land use history of three spruce-fir forest sites in Southern Appalachians. *Journal of Forest History*. 32: 4-21.

Pyle, C.; Wentworth, T.R. 1988. Photo-monitoring of red spruce condition on Great Smoky Mountains National Park, Tennessee and North Carolina. *Permanent Plotter*. 2: 2-3.

Reams, Gregory A.; Nicholas, N.S.; Zedaker, S.M. 1993. Two hundred year variation of southern red spruce radial growth as estimated by spectral analysis. *Canadian Journal of Forest Research*. 23: 291-301.

Rebbeck, Joanne; Jensen, Keith F.; Greenwood, Michael S. 1992. Ozone effects on grafted mature and juvenile red spruce. *Canadian Journal of Forest Research*. 22: 756-760.

Rebbeck, Joanne; Jensen, Keith F.; Greenwood, Michael S. 1993. Ozone effects on grafted mature and juvenile red spruce: photosynthesis, stomatal conductance, and chlorophyll concentration. *Canadian Journal of Forest Research*. 23: 450-456.

Reisinger, Lawrence M. 1990. Analysis of airborne particles sampled in the Southern Appalachian mountains. *Water, Air, and Soil Pollution*. 50: 149-162.

Reisinger, Lawrence M.; Imhoff, Robert E. 1989. Analysis of summertime cloud water measurements made in a Southern Appalachian spruce forest. *Water, Air, and Soil Pollution*. 45: 1-15.

Richardson, C.J.; DiGiulio, R.T.; Tandy, N.E. 1989. Free radical-mediated processes as markers of air pollution stress in trees. In: National Research Council: biologic markers of air pollution stress and damage in forests; 1989 April 23-28; Little Switzerland, NC. Washington, DC: National Academy Press: 251-260.

Robarge, W.P.; Bruck, R.I.; Cowling, E.B. 1989. Throughfall and stem flow measurements at Mt. Mitchell, NC, during the summer of 1986: a preliminary report. In: Hertel, G.D., tech. coord. Effects of atmospheric pollutants on the spruce-fir forests of the eastern United States and the Federal Republic of Germany. Proceedings of the United States/Federal Republic of Germany research symposium; 1987 October 19-23; Burlington, VT. Gen. Tech. Rep. NE-120. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station: 111-116.

Robarge, W.P.; Pye, J.M.; Bruck, R.I. 1989. Foliar elemental composition of spruce-fir in the Southern Blue Ridge Province. *Plant and Soil*. 114: 19-34.

Robarge, Wayne P.; Aneja, Viney P.; Cowling, Ellis B. 1992. Relationship of atmospheric deposition to throughfall chemistry in a coniferous canopy. In: Flagler, Richard B., ed. The response of southern commercial forests to air pollution: transactions. A&WMA Transactions Ser. TR-21. Pittsburg, PA: Air & Waste Management Association: 135-147.

Roberts, B.R.; Cannon, W.M. 1989. Changes in xylem pressure potential of red spruce seedlings treated with ozone and acid rain. *Canadian Journal of Forest Research*. 19: 1200-1203.

Sasser, C.L.; Binkley, D.D. 1989. Nitrogen mineralization in high elevation forests of the Appalachians II: patterns withstand development in fir waves. *Biogeochemistry*. 7: 147-156.

-
- Schier, George A.; Jensen, Keith F. 1992. Atmospheric deposition effects of foliar injury and foliar leaching in red spruce. In: Eagar, Christopher; Adams, Mary Beth, eds. Ecology and decline of red spruce in the eastern United States. New York: Springer-Verlag: 271-294.
- Seiler, J.R.; Caxell, B.H. 1990. Influence of water stress on the physiology and growth of red spruce seedlings. *Tree Physiology*. 6: 69-77.
- Seiler, J.R.; Pagnelli, D.J. 1987. Photosynthesis and growth response of red spruce and loblolly pine to soil-applied lead and simulated acid rain. *Forest Science*. 33: 668-675.
- Seiler, J.R.; Tseng, E.C.; Chevone, B.I.; Pagnelli, D.J. 1988. The impact of acid rain on Fraser fir seedling growth and physiology. In: Hertel, G.D., tech. coord. Effects of atmospheric pollutants on the spruce-fir forests of the eastern United States and the Federal Republic of Germany. Proceedings of the United States/Federal Republic of Germany research symposium; 1987 October 19-23; Burlington, VT. Gen. Tech. Rep. NE-120. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station: 417-420.
- Sheppard, L.J.; Smith, R.I.; Cannel, M.G.R. 1988. Frost hardiness of *Picea rubens* growing in spruce decline regions of the Appalachians. *Tree Physiology*. 5: 25-37.
- Silver, W.L.; Siccama, T.G.; Johnson, C.; Johnson, A.H. 1991. Changes in red spruce populations in montane forests of the Appalachians, 1982-1987. *American Midland Naturalist*. 125: 340-347.
- Skelly, J.M. 1989. Forest decline vs. tree decline—the pathological considerations. *Environmental Monitoring and Assessment*. 12: 23-27.
- Solomon, D.S. 1988. Modeling stand dynamics of spruce-fir forests in the Northeast. In: Hertel, G.D., tech. coord. Effects of atmospheric pollutants on the spruce-fir forests of the eastern United States and the Federal Republic of Germany. Proceedings of the United States/Federal Republic of Germany research symposium; 1987 October 19-23; Burlington, VT. Gen. Tech. Rep. NE-120. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station: 78-95.
- Solomon, D.S.; Droessler, T.D. 1990. Balsam fir bole growth and foliage production in response to defoliation. In: Dixon, R. et al., eds. Process modeling of forest growth: response to environmental stress. Portland, OR: Timber Press: 410-415.
- Solomon, D.S.; Hayslett Jr., H.T.; 1986. Predicted foliage production for defoliated balsam fir trees using a matrix model. In: Solomon, D.S.; Brann, T.B., eds. Environmental influences on tree and stand increment. Proceedings of the International Union of Forestry Research Organizations mensuration growth yield and instruments and methods in forest mensuration workshop; 1985 September 23-27; Durham, NH. Misc. Publ. 691. Orono, ME: Maine Agricultural Experiment Station, University of Maine: 138-145.

-
- Solomon, D.S.; Hosmer, R.A. 1988. A growth and yield model (FIBER) for multiple species stands within different forest types. In: Proceedings of the International Union of Forestry Research Organizations forest growth modeling and prediction conference; 1988 August 23-27; Minneapolis, MN. Gen. Tech. Rep. NC-120. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station: 217-223.
- Solomon, D.S.; Hosmer, R.A. 1987. Adaption of a spruce-fir growth model to simulate extraordinary stress. In: Proceedings of economic and social development: a role for forests and forestry professionals; 1987 October 18-21; Minneapolis, MN. Washington, DC: Society of American Foresters: 63-67.
- Stam, A.C.; McLaughlin, S.B.; McCormick, J.F. 1990. Effects of acidic precipitation on the soil chemistry and bioavailability of aluminum, manganese, and copper. ORNL/TM-11569. Oak Ridge, TN: Oak Ridge National Laboratory. 287 p.
- Strader, R.H.; Binkley, D.D.; Wells, C.G. 1989. Nitrogen mineralization in high elevation forests of the Appalachians I: regional patterns in southern spruce-fir forests. *Biogeochemistry*. 7: 131-145.
- Strimbeck, G.R.; Vann, D.R.; Johnson, A.H. 1991. *In situ* experimental freezing produces symptoms of winter injury in red spruce foliage. *Tree Physiology*. 9: 359-367.
- Tabor, C.A. 1988. Culture techniques to generate roots of red spruce (*Picea rubens* Sarg.) for use in electrophysiological studies. In: Hertel, G.D., tech. coord. Effects of atmospheric pollutants on the spruce-fir forests of the eastern United States and the Federal Republic of Germany. Proceedings of the United States/Federal Republic of Germany research symposium; 1987 October 19-23; Burlington, VT. Gen. Tech. Rep. NE-120. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station: 505-506.
- Tandy, N.E.; DiGiulio, R.T.; Richardson, C.J. 1988. Assay and electrophoresis of superoxide dismutase from red spruce (*Picea rubens* Sarg.), loblolly pine (*Pinus taeda* L.), and scotch pine (*Pinus sylvestris*): a method for biomonitoring. *Plant Physiology*. 90: 742-748.
- Tandy, N.E.; DiGiulio, R.T.; Richardson, C.J. 1988. Isozymes of superoxide dismutase in red spruce and their importance in protecting against oxidative stress. In: Hertel, G.D., tech. coord. Effects of atmospheric pollutants on the spruce-fir forests of the eastern United States and the Federal Republic of Germany. Proceedings of the United States/Federal Republic of Germany research symposium; 1987 October 19-23; Burlington, VT. Gen. Tech. Rep. NE-120. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station: 365-370.
- Thornton, F.C. 1988. Design of an open-top chamber to study the effects of clouds and ozone on spruce seedlings. In: Hertel, G.D., tech. coord. Effects of atmospheric pollutants on the spruce-fir forests of the eastern United States and the Federal Republic of Germany. Proceedings of the United States/Federal Republic of Germany research symposium; 1987 October 19-23; Burlington, VT. Gen. Tech. Rep. NE-120. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station: 427-430.

-
- Thornton, F.C.; Joslin, J.D.; Pier, P.A.; Neufeld, H.; Seiler, J.R.; Hutcherson, J.D. 1994. Atmospheric pollutants: Cloudwater and ozone effects upon high elevation red spruce: A summary of study results from Whitetop Mountain, Virginia. *Journal of Environmental Quality*. 23: 1158-1167.
- Thornton, F.C.; McDuffie Jr., C.; Pier, P.A.; Wilkinson, R.C. 1993. The effects of removing cloudwater and lowering ambient O₃ on red spruce grown at high elevations in the Southern Appalachians. *Environmental Pollution*. 79(1): 21-29.
- Thornton, F.C.; Pier, P.A.; McDuffie, C.C. 1990. Response of growth, photosynthesis and mineral nutrition of red spruce seedlings to ozone and acidic cloud deposition. *Environmental and Experimental Biology*. 30: 313-323.
- Thornton, F.C.; Pier, P.A.; McDuffie Jr., C.C. 1992. Red spruce response to ozone and cloudwater after three years exposure. *Journal of Environmental Quality*. 21(2): 196-202.
- Tobi, D.R.; Wallner, W.E.; Parker, B.L. 1988. The conifer swift moth, *Hepialus gracilis*, and spruce-fir decline. In: Hertel, G.D., tech. coord. Effects of atmospheric pollutants on the spruce-fir forests of the eastern United States and the Federal Republic of Germany. Proceedings of the United States/Federal Republic of Germany research symposium; 1987 October 19-23; Burlington, VT. Gen. Tech. Rep. NE-120. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station: 351-354.
- Tobi, Donald R.; Leonard, Jonathan G.; Parker, Bruce L.; Wallner, William E. 1992. Survey methods, distribution, and seasonality of *Korscheltellus gracilis* (Lepidoptera: Hepialidae) in the Green Mountains, Vermont. *Environmental Entomology*. 21(3): 447-452.
- Tseng, E.C.; Seiler, J.R.; Chevone, B.I. 1988. Effects of ozone and water stress on green-house-grown Fraser fir seedling growth and physiology. *Environmental and Experimental Botany*. 28: 37-41.
- Van Miegroet, Halga; Johnson, Dale W.; Todd, Donald E. 1993. Foliar response of red spruce saplings to fertilization with Ca and Mg in the Great Smoky Mountains National Park. *Canadian Journal of Forest Research*. 23(1): 89-95.
- Vann, D.R.; Johnson, A.H. 1988. Design and testing of a field branch enclosure for the exclusion of atmospheric components. In: Hertel, G.D., tech. coord. Effects of atmospheric pollutants on the spruce-fir forests of the eastern United States and the Federal Republic of Germany. Proceedings of the United States/Federal Republic of Germany research symposium; 1987 October 19-23; Burlington, VT. Gen. Tech. Rep. NE-120; Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station: 431-440.
- Vann, D.R.; Strimbeck, G.R.; Johnson, A.H. 1992. Effects of ambient levels of airborne chemicals on freezing resistance of red spruce foliage. *Forest Ecology and Management*. 51(1-3): 69-79.
- Vong, Richard J.; Bailey, Bruce H.; Markus, Michael J.; Mohnen, Volker A. 1990. Factors governing cloud water composition in the Appalachian mountains. *Tellus*. 42B: 435-453.

-
- Vong, Richard J.; Sigmon, John T.; Mueller, Stephen F. 1991. Cloud water deposition to Appalachian forests. *Environmental Science and Technology*. 25(6): 1014-1021.
- Waite, Carl E.; DeHayes, Donald H. 1992. Developmental cold tolerance of red spruce and balsam fir provenances. In: DeHayes, Donald H.; Hawley, Gary J., eds. *Proceedings of the first northern forest genetics association conference*; 1991 July 23-25; Burlington, VT. Burlington, VT: The University of Vermont: 99-108.
- Wargo, P.M. 1988. Elevation and *Armillaria* species relationships in spruce-fir forests of Northeastern United States. In: Morrison, D.J., ed. *Proceedings of the seventh International Union of Forestry Research Organizations root and butt rot conference*; 1988 August 9-16; Vernon and Victoria, British Columbia. Victoria, British Columbia: Forestry Canada: 340-346.
- Wargo, P.M.; Carey, A.C.; Geballe, G.T.; Smith, W.H. 1987. Occurrence of rhizomorphs of *armillaria* in soils from declining red spruce stands in three forest types. *Plant Disease*. 71: 163-167.
- Wells, C.G.; Jones, A.; Craig, J.J. 1988. Denitrification in Southern Appalachian spruce-fir forests. In: Hertel, G.D., tech. coord. *Effects of atmospheric pollutants on the spruce-fir forests of the eastern United States and the Federal Republic of Germany. Proceedings of the United States/Federal Republic of Germany research symposium*; 1987 October 19-23; Burlington, VT. Gen. Tech. Rep. NE-120. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station: 117-122.
- Wentworth, T.R.; White, P.S.; Pyle, C.C.; Schafale, M.P. 1988. Compilation and interpretation of the vegetation data base and disturbance history of Southern Appalachian spruce-fir. In: Hertel, G.D., tech. coord. *Effects of atmospheric pollutants on the spruce-fir forests of the eastern United States and the Federal Republic of Germany. Proceedings of the United States/Federal Republic of Germany research symposium*; 1987 October 19-23; Burlington, VT. Gen. Tech. Rep. NE-120. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station: 145-150.
- White, Peter S.; Cogbill, Charles V. 1992. Spruce-fir forests of eastern North America. In: Eagar, Christopher; Adams, Mary Beth, eds. *Ecology and decline of red spruce in the eastern United States*. New York: Springer-Verlag: 3-39.
- Wilkinson, R.C. 1988. Geographic variation in needle morphology of red spruce in relation to winter injury and decline. In: Hertel, G.D., tech. coord. *Effects of atmospheric pollutants on the spruce-fir forests of the eastern United States and the Federal Republic of Germany. Proceedings of the United States/Federal Republic of Germany research symposium*; 1987 October 19-23; Burlington, VT. Gen. Tech. Rep. NE-120. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station: 507-514.
- Wilkinson, Ronald C. 1991. Effects of winter injury on basal area and height growth of 30-year-old red spruce from 12 provenances growing in Northern New Hampshire. *Canadian Journal of Forest Research*. 20: 1616-1622.

-
- Wilkinson, Ronald C. 1992. Variation in needle characteristics and transpiration of red spruce and seedling progeny from high and low elevation stands in Northern Vermont. In: DeHayes, Donald H.; Hawley, Gary J., eds. Proceedings of the 1st Northern Forest Genetics Association Conference; 1991 July 23-25; Burlington, VT. Burlington, VT: The University of Vermont: 78-98.
- Wolfenden, J.; Pearson, M.; Francis, B.J. 1991. Effects of over-winter fumigation with sulphur and nitrogen dioxides on biochemical parameters and spring growth in red spruce (*Picea rubens* Sarg.). Plant, Cell and Environment. 14: 35-45.
- Wolfenden, J.; Robinson, D.C.; Cape, J.N.; Patterson, I.S.; Francis, B.J.; Mehlhorn, H.H.; Wellburn, A.R. 1988. Use of carotenoid ratios, ethylene emissions and buffer capacities for the early diagnosis of forest decline. New Phytologist. 109: 85-95.
- Zarnock, S.J. 1988. Modeling activities within the spruce-fir research cooperative. In: Hertel, G.D., tech. coord. Effects of atmospheric pollutants on the spruce-fir forests of the eastern United States and the Federal Republic of Germany. Proceedings of the United States/Federal Republic of Germany research symposium; 1987 October 19-23; Burlington, VT. Gen. Tech. Rep. NE-120. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station: 69-74.
- Zarnoch, Stanley J.; Gansner, David A.; Powell, Douglas S.; Birch, Thomas W. 1990. Stand basal-area and tree-diameter growth in red spruce-fir forests in Maine, 1960-80. Res. Pap. NE-633. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station. 18 p.
- Zedaker, S.M.; Hyink, D.M.; Smith, S.W. 1987. Growth declines in red spruce: are they anthropogenic or natural? Journal of Forestry. 85: 34-36.
- Zedaker, S.M.; Nicholas, N.S.; Eagar, C. 1989. Assessment of forest decline in the southern Appalachian spruce-fir forest, USA. In: Bucher, J.B.; Bucher-Wallin, I., eds. Proceedings of the International Union of Forestry Research Organizations conference on air pollution and forest decline; 1988 October 2-8; Interlaken, Switzerland. Birmensdorf, Switzerland: IUFRO: 239-244.
- Zedaker, S.M.; Nicholas, N.S.; Eagar, C.; White, P.S.; Burk, T.E. 1988. Stand characteristics associated with potential decline of spruce-fir forests in the southern Appalachians. In: Hertel, G.D., tech. coord. Effects of atmospheric pollutants on the spruce-fir forests of the eastern United States and the Federal Republic of Germany. Proceedings of the United States/Federal Republic of Germany research symposium; 1987 October 19-23; Burlington, VT. Gen. Tech. Rep. NE-120. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station: 123-132.
-

Synthesis and Integration Project

- Bassow, S.L.; Ford, E.D.; Kiester, A.R. 1990. A critique of carbon based tree models. In: Dixon, Robert K., ed. Process modeling of forest growth responses to environmental stress. Portland, OR: Timber Press. [Page numbers unknown].
- Erickson, H.E.; Edmonds, R.L.; Peterson, C.E. 1985. Decomposition of logging residues in Douglas-fir, western hemlock, pacific silver fir and ponderosa pine ecosystems. *Canadian Journal of Forest Research*. 15: 914-921.
- Ford, E.D.; Bassow, S.L. 1989. Modeling the dependence of forest growth on environmental influences. In: Pereira, J.S., ed. Biomass production by fast-growing trees. Proceedings of the NATO Advanced Research Workshop; 1987 October 6-10; Obidos, Portugal. Netherlands: Kluwer Academic Publishers: [Page numbers unknown].
- Ford, E.D.; Bassow, S.L. 1988. Modeling the influence of pollution on allocation. In: Ek, A.R.; Shifley, S.R.; Burk, T.E., eds. Proceedings of the International Union of Forestry Research Organizations forest growth modeling and prediction conference; 1987 August 23-27; Minneapolis, MN. Gen. Tech. Rep. NC-120. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station: 450-457.
- Ford, E.D.; Kiester, A.R. 1990. Modeling the effects of pollutants on the process of tree growth. In: Dixon, Robert K., ed. Process modeling of forest growth responses to environmental stress. Portland, OR: Timber Press: [Page numbers unknown].
- Haskins, J.L.; Ford, E.D. 1990. Patterns of water potential, flow and resistance in trees: filling the gap between two spatial scales. In: Dixon, Robert K., ed. Process modeling of forest growth responses to environmental stress: Portland, OR: Timber Press: [Page numbers unknown].
- Kiester, A.R. 1987. Background for the synthesis and integration of forest response to atmospheric deposition. In: Bicknell, S.H., ed. Proceedings of the California Forest Response Program planning conference; 1987 February 22-24; Pacific Grove, CA. Arcata, CA: Humboldt State University Foundation: 136-151.
- Kiester, A.R. 1990. Process modeling of tree and forest growth: current perspectives and future needs. In: Dixon, Robert K., ed. Forest modeling of forest growth responses to environmental stress. Portland, OR: Timber Press: [Page numbers unknown].
- Kiester, A.R. 1988. The roles of models in the Forest Response Program. In: Ek, A.R.; Shifley, S.R.; Burk, T.E., eds. Proceedings of the International Union of Forestry Research Organizations forest growth modeling and prediction conference; 1987 August 23-27; Minneapolis, MN. Gen. Tech. Rep. NC-120. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station: 498-505.

-
- Larson, T.V.; Vong, R.J. 1990. A theoretical investigation of the pressure and temperature dependence of atmospheric ozone deposition to trees. *Environmental Pollution*. 67(2): 179-189.
- Mattson, K.G.; Arnaut, L.Y.; Reams, G.A.; Cline, S.P.; Peterson, C.E.; Vong, R.J. 1990. Response of forest trees to sulfur, nitrogen, and associated pollutants. EPA Report EPA/600/3-90/074. Corvallis, OR: U.S. Environmental Protection Agency, Environmental Research Laboratory. 134. p.
- Miller, R.E.; Barker, P.R.; Peterson, C.E.; Webster, S.R. 1986. Using nitrogen in the management of Douglas-fir: I. Regional trends of response. In: *Proceedings of the symposium, Douglas-fir: stand management of the future*; 1985 June [Day unknown]; Seattle, WA. Seattle, WA: University of Washington: 290-303.
- Peterson, C.E. 1989. Statistical issues for seedling studies in air pollution research. In: Bucher, J.; Bucher-Wallin, I., eds. *Proceedings of the International Union of Forestry Research Organizations conference on air pollution and forest decline*; 1988 October 2-8; Interlaken, Switzerland. Birmensdorf, Switzerland: IUFRO: 496-498.
- Peterson, C.E. 1986. The effect of nitrogen on proportional growth relationships of Douglas-fir. In: Solomon, D.S.; Brann, T.B., eds. *Proceedings of the International Union of Forestry Research Organizations mensuration growth yield and instruments and methods in forest mensuration workshop*; 1985 September 23-27; Durham, NH. Misc. Publ. 691. Orono, ME: Maine Agricultural Experiment Station, University of Maine: 74-79.
- Peterson, C.E.; Mattson, K.G.; Mickler, R.A. 1989. Seedling response to sulfur, nitrogen, and associated pollutants. EPA/600/3-89/081. Corvallis, OR: U.S. Environmental Protection Agency. 104 p.
- Peterson, C.E.; Webster, S.R.; Barker, P.R.; Miller, R.E. 1986. Using nitrogen in the management of Douglas-fir: II. Future informational needs. In: *Proceedings of the symposium, Douglas-fir: stand management for the future*; 1985 June [Day unknown]; Seattle, WA. Seattle, WA: University of Washington: 304-309.
- Peterson, Charles E.; Mickler, Robert A. 1994. Considerations for evaluating controlled exposure studies of tree seedlings. *Journal of Environmental Quality*. 23(2): 257-267.
- Reams, G.A. 1989. Dendrochronology and spatial analysis. In: Noble, R.D.; Martin, J.L.; Jensen, K.F., eds. *Proceedings of the 2nd US-USSR symposium on air pollution effects on vegetation including forest ecosystems*; 1988 September 13-25; Corvallis, OR, Raleigh, NC, and Gatlinburg, TN. Gen. Tech. Rep. NE-120. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station: 43-48.
- Ritters, K.H. 1988. Process models for monitoring forest health. In: Ek, A.R.; Shifley, S.R.; Burk, T.E., eds. *Proceedings of the International Union of Forestry Research Organizations forest growth modeling and prediction conference*; 1987 August 23-27; Minneapolis, MN. Gen. Tech. Rep. NC-120. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station: 340-344.

-
- Schroeder, P.; Kiester, A.R. 1989. The Forest Response Program: national research on forest decline and air pollution. *Journal of Forestry*. 87: 27-32.
- Shriner, David S.; Heck, Walter W.; McLaughlin, Samuel B.; Johnson, Dale W.; Irving, Patricia M.; Joslin, J.D.; Peterson, Charles E. 1991. NAPAP Report 18: Response of vegetation to atmospheric deposition and air pollution. In: *Acidic deposition: State of science and technology*. Washington, DC: The National Acid Precipitation Assessment Program: 18-1 - 18-206 plus appendices.
- Vong, R.J. 1990. Mid-latitude, Northern Hemisphere background concentration of sulfate in rainwater. *Atmospheric Environment*. 24A(5): 1007-1018.
- Vong, R.J.; Bailey, B.H.; Markus, M.J.; Mohnen, V.A. 1990. Factors governing cloud water composition in the Appalachian Mountains. *Tellus*. 42B: 435-453.
- Vong, R.J.; Cline, S.P.; Reams, G.A.; Bernert, J.; Charles, D.; Gibson, J.; Haas, T.; Moore, J.; Husar, R.; Olsen, A.R.; Simpson, J.; Seikop, S. [Year of publication unknown]. Regional analysis of wet deposition for effects research. EPA/600/3-89/030. Corvallis, OR: U.S. Environmental Protection Agency. 42 p.
- Vong, R.J.; Geladi, P.; Wold, S.; Esbensen, K. 1988. Source contributions to ambient aerosol calculated by discriminate partial least squares regression (PLS). *Journal of Chemometrics*. 2: 281-296.
- Vong, R.J.; Hansson, H.C.; Covert, D.S.; Charlson, R.J. 1988. Acid rain: simultaneous observations of a natural marine background and its acidic sulfate aerosol precursor. *Geophysical Research Letters*. 14: 338-341.
- Vong, R.J.; Moseholm, L.; Covert, D.S.; Sampson, P., et al. 1988. Changes in rainwater acidity associated with the closure of a copper smelter. *Journal of Geophysical Research*. 93: 7169-7179.
- Warren, W.G. 1987. Consequences of various growth models. In: Ek, A.R.; Shifley, S.R.; Burk, T.E., eds. *Proceedings of the International Union of Forestry Research Organizations forest growth modeling and prediction conference; 1987 August 23-27; Minneapolis, MN*. Gen. Tech. Rep. NC-120. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station. 1149 p.
- Warren W.G. 1987. Levels of significance. *New Zealand Mathematics Magazine*. 24: 29-30.
- Warren, W.G. 1986. On the presentation of statistical analysis: reason or ritual. *Canadian Journal of Forest Research*. 16: 1185-1191.
- Warren, W.G. 1988. Statistics in forestry. In: Johnson, N.L.; Kotz, S.; Read, C.B., eds. *Encyclopedia of Statistical Science*. 8: 725-732.
- Warren, William G.; Bohm, Margi; Link, Denise. 1992. Statistical methodology for exploring elevational differences in precipitation chemistry. *Atmospheric Environment*. 26A(1): 159-169.
-

Western Conifers Research Cooperative

- Andersen, C.P.; Hogsett, W.E.; Wessling, R.; Plocher, M. 1991. Ozone decreases spring root growth and root carbohydrate content in ponderosa pine the year following exposure. *Canadian Journal of Forest Research*. 21: 1288-1291.
- Anderson, P.D.; Houpis, J.L.J. 1991. Foliar nutrient status of *Pinus ponderosa* exposed to ozone and acid rain. Supplement to: *Plant Physiology*. 96: 173.
- Anderson, P.D.; Houpis, J.L.J.; Neuman, L.E.; Phelps, S.P.; Loeffler, A.T.; Benes, S.E. 1990. The establishment of a facility for the long-term exposure of mature branches and seedlings of ponderosa pine (*Pinus ponderosa*) to ozone and acid rain. In: Proceedings of the 11th North American forest biology workshop; 1990 June 13-15; Athens, GA. Athens, GA and Bethesda, MD: University of Georgia and Society of American Foresters: 7.
- Arbaugh, M.J. 1989. Selecting analysis procedures for exogenous disturbance tree-ring studies. In: Noble, R.D.; Martin, J.L.; Jensen, K.F., eds. Proceedings of the 2nd US-USSR symposium on air pollution effects on vegetation including forest ecosystems; 1988 September 13-25; Corvallis, OR, Raleigh, NC, and Gatlinburg, TN. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station: 57-61.
- Arbaugh, M.J.; Peterson, D.L. 1993. Stemwood production patterns in ponderosa pine: effects of stand dynamics and other factors. Res. Pap. PSW-RP-136. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station. 11 p.
- Arbaugh, M.J.; Peterson, D.L. 1989. Variable selection in dendroclimatology: an example using simulated tree-ring series. *Forest Science*. 35(2): 294-302.
- Basabe, F.A.; Edmonds, R.L.; Chang, W.L.; Larson, T.V. 1989. Fog and cloud water chemistry in Western Washington. In: Olson, R.K.; Lefohn, A.S., eds. Effects of air pollution on western forests. APCA Ser. TR-16. Pittsburgh, PA: Air & Waste Management Association: 33-49.
- Benes, S.E.; Houpis, J.L.J. 1989. Effect of water stress on chlorophyll and carotenoid contents on seedlings from three seed sources of *Pinus ponderosa*. Supplement to: *Plant Physiology*. 89: 124.
- Benes, S.E.; Murphy, T.M.; Anderson, P.D.; Houpis, J.L.J.; Lauchli, A. 1990. Antioxidant activity in mature branches of ponderosa pine (*Pinus ponderosa*) under long-term, low concentration ozone exposure. Supplement to: *Plant Physiology*. 93: 100.
- Benes, S.E.; Murphy, T.M.; Anderson, P.D.; Houpis, J.L.J.; Lauchli, A. 1991. Antioxidant enzyme activity and photosynthesis in mature branches of ponderosa pine exposed to ozone and acid precipitation. Supplement to: *Plant Physiology*. 96: 113.

-
- Binkley, D. 1992. Sensitivity of forest soils in the Western U.S. to acidic deposition. In: Olson, R.K.; Binkley, D.; Bohm, M., eds. The response of western forests to air pollution. New York: Springer-Verlag: 153-181.
- Binkley, D.; Droessler, T.D.; Miller, J. 1992. Pollution impacts at the stand and ecosystem levels. In: Olson, R.K.; Binkley, D.; Bohm, M., eds. The response of western forests to air pollution. New York: Springer-Verlag: 235-257.
- Bohm, M. 1989. A regional characterization of air quality and deposition in the coniferous forests of the Western United States. In: Olson, R.K.; Lefohn, A.S., eds. Effects of air pollution on western forests. APCA Ser. TR-16. Pittsburgh, PA: Air & Waste Management Association: 221-246.
- Bohm, M. 1992. Air quality and deposition. In: Olson, R.K.; Binkley, D.; Bohm, M., eds. The response of western forests to air pollution. New York: Springer-Verlag: 63-152.
- Bohm, M.; McCune, B.; Vandetta, T. 1991. Diurnal curves of tropospheric ozone in the Western United States. *Atmospheric Environment*. 25A(8): 1577-1590.
- Bohm, M.; Vandetta, T. 1990. Atlas of air quality and deposition in or near forests of the Western United States. EPA/600/3-90/081. Corvallis, OR: Environmental Research Laboratory, Office of Research and Development, Environmental Protection Agency. 469 p.
- Brubaker, L.B.; Graumlich, L.J. 1989. 100-year records of forest productivity at high elevation in Western Washington, USA. In: Noble, R.D.; Martin, J.L.; Jensen, K.F., eds. Proceedings of the 2nd US-USSR symposium on air pollution effects on vegetation including forest ecosystems; 1988 September 13-25; Corvallis, OR, Raleigh, NC, and Gatlinburg, TN. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station: 49-56.
- Brubaker, L.B.; Vega-Gonzalez, S.; Ford, E.D.; Ribic, C.A.; Earle, C.J.; Segura, G. 1992. Old-growth Douglas-fir in Western Washington. In: Olson, R.K.; Binkley, D.; Bohm, M., eds. The response of western forests to air pollution. New York: Springer-Verlag: 333-364.
- Burke, I.C.; Reiners, W.A.; Olson, R.K. 1989. Topographic control of vegetation in a mountain big sagebrush steppe. *Vegetation*. 84: 77-86.
- Bytnerowicz, A.; Grulke, N.E. 1992. Physiological effects of air pollutants on western trees. In: Olson, R.K.; Binkley, D.; Bohm, M., eds. The response of western forests to air pollution. New York: Springer-Verlag: 183-233.
- Cline, S.P.; Burkman, W.G. 1989. The role of quality assurance in ecological research programs. In: Bucher, J.; Bucher-Wallin, I., eds. Proceedings of the International Union of Forestry Research organizations conference on air pollution and forest decline; 1988 October 2-8; Interlaken, Switzerland. Birmensdorf, Switzerland: IUFRO: 361-365.

-
- Edmonds, R.L.; Basabe, F.A. 1989. Ozone concentrations above a Douglas-fir forest canopy in Western Washington, USA. *Atmospheric Environment*. 23: 625-629.
- Gay, C.A. 1989. Modeling tree level processes. In: Noble, R.D.; Martin, J.L.; Jensen, K.F., eds. *Proceedings of the 2nd US-USSR symposium on air pollution effects on vegetation including forest ecosystems*; 1988 September 13-25; Corvallis, OR, Raleigh, NC, and Gatlinburg, TN. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station: 143-159.
- Graybill, D.A.; Peterson, D.L.; Arbaugh, M.J. 1992. Coniferous forests of the Colorado Front Range. In: Olson, R.K.; Binkley, D.; Bohm, M., eds. *The response of western forests to air pollution*. New York: Springer-Verlag: 365-401.
- Graybill, D.A.; Rose, M.R. 1992. Coniferous forests of Arizona and New Mexico. In: Olson, R.K.; Binkley, D.; Bohm, M., eds. *The response of western forests to air pollution*. New York: Springer-Verlag: 403-431.
- Graybill, D.A.; Rose, M.R. 1989. Analysis of growth trends and variation in conifers from Arizona and New Mexico. In: Olson, R.K.; Lefohn, A.S., eds. *Effects of air pollution on western forests*. APCA Ser. TR-16. Pittsburgh, PA: Air & Waste Management Association: 395-412.
- Graybill, D.A.; Rose, M.R. 1992. Coniferous forests of Arizona and New Mexico. In: Olson, R.K.; Binkley, D.; Bohm, M., eds. *The response of western forests to air pollution*. New York: Springer-Verlag: 403-431.
- Graybill, D.A.; Shiyatov, S.G. 1989. A 1009 year tree-ring reconstruction of mean June-July temperature deviations in the Polar Urals. In: Noble, R.D.; Martin, J.L.; Jensen, K.F., eds. *Proceedings of the 2nd US-USSR symposium on air pollution effects on vegetation including forest ecosystems*; 1988 September 13-25; Corvallis, OR, Raleigh, NC, and Gatlinburg, TN. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station: 37-42.
- Henderson, S.; Olson, R.K.; Noss, R.F. 1989. Current and potential threats to biodiversity in forests of the lower Pacific Coast States. In: Olson, R.K.; Lefohn, A.S., eds. *Effects of air pollution on western forests*. APCA Ser. TR-16. Pittsburgh, PA: Air & Waste Management Association: 325-336.
- Hogsett, W.E.; Tingey, D.T.; Hendricks, C.; Rossi, D. 1989. Sensitivity of western conifers to SO₂ and seasonal interactions of acid fog and ozone. In: Olson, R.K.; Lefohn, A.S., eds. *Effects of air pollution on western forests*. APCA Ser. TR-16. Pittsburgh, PA: Air & Waste Management Association: 469-492.
- Houpis, J.L.J., Anderson, P.D. 1991. Seasonal differences in needle gas exchange between mature branches and seedlings of *Pinus ponderosa*. *Supplement to: Plant Physiology*. 96: 166.

-
- Houpis, J.L.J.; Benes, S.E. 1989. Carbohydrate translocation and branch autonomy of *Pinus ponderosa*. A report to Blodgett Forest Research Station, Department of Forestry and Resource Management, University of California, Berkeley, CA. Livermore, CA: University of California, Lawrence Livermore National Laboratory. 3 p.
- Houpis, J.L.J.; Costella, M.P.; Cowles, S. 1991. A branch exposure chamber for fumigating mature branches of *Pinus ponderosa* to atmospheric pollution. *Journal of Environmental Quality*. 20: 467-474.
- Houpis, J.L.J.; Surano, K.A.; Cowles, S.; Shinn, J.H. 1988. Chlorophyll and carotenoid content of two varieties of *Pinus ponderosa* seedlings subjected to long-term elevated carbon dioxide. *Tree Physiology*. 4: 187-193.
- Knoepp, J.D.; Turner, D.P.; Tingey, D.T. 1993. Effects of ammonium and nitrate on nutrient uptake and activity of nitrogen assimilating enzymes in western hemlock. *Forest Ecology and Management*. 59: 179-191.
- Lovett, G.M.; Reiners, W.A.; Olson, R.K. 1989. Factors controlling throughfall chemistry in a balsam fir canopy: a modeling approach. *Biogeochemistry*. 8: 239-264.
- Miller, P.R. 1992. Mixed conifer forests of the San Bernardino Mountains, California. In: Olson, R.K.; Binkley, D.; Bohm, M., eds. *The response of western forests to air pollution*. New York: Springer-Verlag: 461-497.
- Miller, D.F.; Borys, R.D.; Graw, R. 1989. Chemistry of summer cloud, precipitation and air at a Rocky Mountain top location. In: Olson, R.K.; Lefohn, A.S., eds. *Effects of air pollution on western forests*. APCA Ser. TR-16. Pittsburgh, PA: Air & Waste Management Association: 105-116.
- Muir, P.S.; Bohm, M. 1989. Cloud chemistry and occurrence in the Western United States: a synopsis of current information. In: Olson, R.K.; Lefohn, A.S., eds. *Effects of air pollution on western forests*. APCA Ser. TR-16. Pittsburgh, PA: Air & Waste Management Association: 73-104.
- Neuman, L.; Houpis, J.L.J.; Anderson, P.D. 1990. Among-clone comparison of the response of photosynthetic pigments in mature branches of *Pinus ponderosa* to long-term exposure of ozone and acid rain. *Supplement to: Plant Physiology*. 93: 101.
- Neuman, L.E.; Houpis, J.L.J.; Anderson, P.D. 1991. Trends in *Pinus ponderosa* foliar pigment concentration due to chronic exposure of ozone and acid rain. *Supplement to: Plant Physiology*. 96: 172.
- Olson, R.K. 1992. Physiography and forest types. In: Olson, R.K.; Binkley, D.; Bohm, M., eds. *The response of western forests to air pollution*. New York: Springer-Verlag: 7-40.
- Olson, R.K.; Binkley, D.; Bohm, M., eds. 1992. *The response of western forests to air pollution*. New York: Springer-Verlag. 521 p.

-
- Olson, R.K.; Lefohn, A.S., eds. 1989. Effects of air pollution on western forests. APCA Ser. TR-16. Pittsburgh, PA: Air & Waste Management Association. 577 p.
- Olson, R.K.; Peterson, D.L.; Bohm, M. 1992. Summary, projections, and recommendations. In: Olson, R.K.; Binkley, D.; Bohm, M., eds. The response of western forests to air pollution. New York: Springer-Verlag: 501-521.
- Peterson, C.E.; Hazard, J.W. 1990. Regional variation in growth response of coastal Douglas-fir to nitrogen fertilizer in the Pacific Northwest. *Forest Science*. 36(3): 625-640.
- Peterson, C.E.; Heath, L.S. 1991. The influence of weather variation on regional growth of Douglas fir stands in the U.S. Pacific Northwest. *Water, Air, and Soil Pollution*. 54: 295-305.
- Peterson Jr., C.E.; Mickler, R.A. 1993. Design issues for evaluating seedling exposure studies. In: Optimal design of forest experiments and forest surveys: Proceedings of International Union of Forestry Research Organizations conference; 1991. September 10-14; London, UK. IUFRO S413. London: University of Greenwich: 213-220.
- Peterson, D.L.; Anderson, D.A. 1990. Content of chemical elements in tree rings of lodgepole pine and whitebark pine cores from a subalpine Sierra Nevada forest. Res. Pap. PSW-RP-200. Berkeley, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station. 9 p.
- Peterson, D.L.; Arbaugh, M.J. 1992. Mixed conifer forests of the Sierra Nevada. In: Olson, R.K.; Binkley, D.; Bohm, M., eds. The response of western forests to air pollution. New York: Springer-Verlag: 433-459.
- Peterson, D.L.; Arbaugh, M.J. 1988. Growth patterns of ozone-injured ponderosa pine (*Pinus ponderosa*) in the Southern Sierra Nevada. *Journal of the Air Pollution Control Association*. 38: 921-927.
- Peterson, D.L.; Arbaugh, M.J.; Lardner, M.A. 1989. Leaf area index of a subalpine Sierra Nevada forest. *Canadian Journal of Forest Research*. 19: 401-403.
- Peterson, D.L.; Arbaugh, M.J.; Robinson, L.J. 1992. Tree growth in high elevation forests of the Sierra Nevada, California, USA. In: Proceedings of the international conference on tree rings and the environment; 3-9 September 1990; Ystad, Sweden. Lund, Sweden: University of Lund: 269-273.
- Peterson, D.L.; Arbaugh, M.J.; Robinson, L.J. 1991. Regional growth trends of ozone-injured ponderosa pine (*Pinus ponderosa*) in the Sierra Nevada, California, USA. *The Holocene*. 1: 50-61.
- Peterson, D.L.; Arbaugh, M.J.; Robinson, L.J. 1989. The effects of ozone stress on tree growth and vigor in the Sierra Nevada of California, USA. In: Bucher, J.; Bucher-Wallin, I., eds. Proceedings of the International Union of Forestry Research Organizations conference on air pollution and forest decline; 1988 October 2-8; Interlaken, Switzerland. Birmensdorf, Switzerland: IUFRO: 289-294.

-
- Peterson, D.L.; Arbaugh, M.J.; Robinson, L.J. 1989. Ozone injury and growth trends of ponderosa pine in the Sierra Nevada. In: Olson, R.K.; Lefohn, A.S., eds. Effects of air pollution on western forests. APCA Ser. TR-16. Pittsburgh, PA: Air & Waste Management Association: 293-307.
- Peterson, D.L.; Arbaugh, M.J.; Robinson, L.J.; Derderian, B. 1990. Growth trends of whitebark pine and lodgepole pine in a subalpine Sierra Nevada forest. Arctic and Alpine Research. 22: 233-243.
- Peterson, D.L.; Arbaugh, M.J.; Wakefield, V.A.; Miller, P.R. 1987. Evidence of growth reduction in ozone-stressed Jeffrey pine (*Pinus jeffreyi* Grev. and Balf.) in Sequoia and Kings Canyon National Parks. Journal of the Air Pollution Control Association. 37: 906-912.
- Peterson, D.L.; Arbaugh, M.J.; Robinson, L.J. 1991. Regional growth changes in ozone-stressed ponderosa pine (*Pinus ponderosa*) in the Sierra Nevada, California, USA. The Holocene. 1: 50-61.
- Peterson, D.L.; Schmoldt, J.M.; Eilers, J.M.; Fisher, R.W.; Doty, R.D. 1993. Guidelines for evaluating air pollution impacts on class I wilderness areas in California. Gen. Tech. Rep. PSW-GTR-136. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station. 34 p.
- Peterson, J.; Schmoldt, D.; Peterson, D.L.; Eilers, J.; Fisher, R.; Bachman, R. 1992. Guidelines for evaluating air pollution impacts on class I wilderness areas in the Pacific Northwest. Gen. Tech. Rep. PNW-GTR-299. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 83 p.
- Phelps, S.P.; Houppis, J.L.J.; Anderson, P.D. 1990. Comparison of stomatal conductance among clones of *Pinus ponderosa* exposed to varying levels of ozone. Supplement to: Plant Physiology. 93: 160.
- Reams, Gregory A.; Peterson Jr, Charles E. 1992. Evaluating changes in forest condition potentially related to acidic deposition: an example using red spruce. Forest Ecology and Management. 51(1-3): 5-16.
- Reiners, W.A.; Olson, R.K.; Howard, L.; Schaefer, D.A. 1986. Ion migration from interiors to outer surfaces of balsam fir needles during dry, interstorm periods. Environmental and Experimental Botany. 26: 227-231
- Rose, M.R.; Bohm, M.; Olson, R.K. 1992. Climate. In: Olson, R.K.; Binkley, D.; Bohm, M., eds. The response of western forests to air pollution. New York: Springer-Verlag: 41-61.
- Schaefer, D.A.; Reiners, W.A.; Olson, R.K. 1988. Factors controlling the chemical alteration of throughfall in a subalpine balsam fir canopy. Environmental and Experimental Botany. 28: 175-189.
- Shriner, D.S.; Heck, W.W.; McLaughlin, S.B.; Johnson, D.W.; Irving, P.M.; Joslin, J.D.; Peterson, C.E. 1990. Response of vegetation to atmospheric deposition and air pollution. NAPAP SOS/T Report 18. In: Acidic deposition: state of science and technology. Washington, DC: National Acid Precipitation Assessment Program. 206 p. [plus appendices].

-
- Stolte, K.W.; Duriscoe, D.M.; Cook, E.R.; Cline, S.P. 1992. Methods of assessing responses of trees, stands and ecosystems to air pollution. In: Olson, R.K.; Binkley, D.; Bohm, M., eds. The response of western forests to air pollution. New York: Springer-Verlag: 259-330.
- Turner, D.P.; Tingey, D.T. 1990. Foliar leaching and root uptake of Ca, Mg and K in relation to acid fog effects on Douglas-fir. *Water, Air, and Soil Pollution*. 49: 205-214.
- Turner, D.P.; Tingey, D.T.; Hogsett, W. 1989. Acid fog effects on conifer seedlings. In: Bucher, J.; Bucher-Wallin, I., eds. Proceedings of the International Union of Forestry Research Organizations conference on air pollution and forest decline; 1988 October 2-8; Interlaken, Switzerland. Birmensdorf, Switzerland: IUFRO: 126-130.
- Turner, D.P.; van Brockhuizen, H.J. 1992. Nutrient leaching from conifer needles in relation to foliar apoplast cation exchange capacity. *Environmental Pollution*. 75: 259-263.
- Turner, David P.; Tingey, David T. 1990. Foliar leaching and root uptake of Ca, Mg and K in relation to acid fog effects on Douglas-fir. *Water, Air, and Soil Pollution*. 49: 205-214.
- Ustin, S.L.; Curtiss, B. 1990. Spectral characteristics of ozone treated conifer species. *Environmental and Experimental Botany*. 30: 293-308.
- Ustin, S.L.; Curtiss, B. 1989. Spectral characteristics of ozone treated conifers. NCASI Tech. Bull. No. 570. New York: National Council of the Paper Industry for Air and Stream Improvement. 21 p.
- Ustin, S.L.; Curtiss, B.; Martens, S.N.; Vanderbilt, V.C. 1989. Early detection of air pollution injury to coniferous forests using remote sensing. In: Olson, R.K.; Lefohn, A.S., eds. Effects of air pollution on western forests. APCA Ser. TR-16. Pittsburgh, PA: Air & Waste Management Association: 351-378.
- Ustin, S.L.; Curtiss, B.; Martens, S.N.; Vanderbilt, V.C. 1988. Use of high spectral resolution sensors to detect air pollution injury in conifer forests. In: Fenstermaker, L.K., ed. Remote sensing applications for acid deposition. U.S. EPA Publ. No. 814002. Las Vegas, NV: U.S. Environmental Protection Agency: 72-85.
- Vong, Richard J.; Guttorp, Peter. 1991. Co-occurrence of ozone and acidic cloudwater in high-elevation forests. *Environmental Science and Technology*. 25(7): 1325.
- Warren, W.G.; Bohm, M.; Link, D. 1992. A statistical methodology for exploring elevational differences in precipitation chemistry. *Atmospheric Environment*. 26A(1): 159-169.
-

